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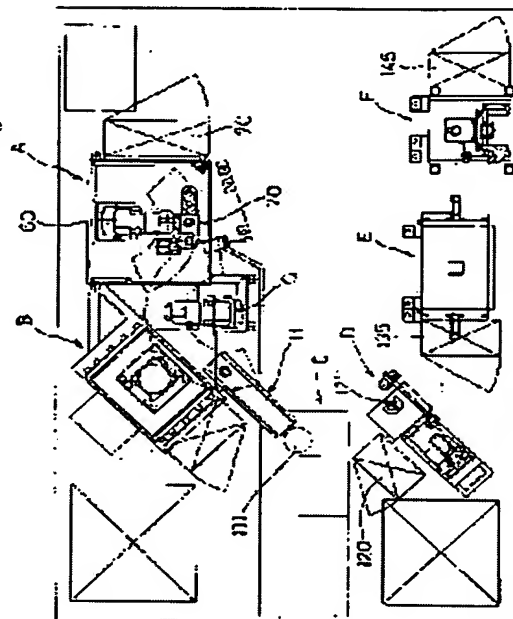
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(54) FACILITIES FOR ASSEMBLING LIQUID FILLED VIBRATION ISOLATING MOUNT

(57)Abstract:

PROBLEM TO BE SOLVED: To achieve remarkable reduction of an equipment cost, rationalization, and improvement of productivity by compacting a floor space for facilities for assembling a liquid filled vibration isolating mount.

SOLUTION: The following apparatuses are laid out so as to form a U shape in a plan view: a component-assembling and liquid-filled equipment A for assembling respective components and filling liquid inside a body component, by supplying the liquid in such a state that a liquid vessel 20 is assembled to the open side of the body component; a body-drawing apparatus B for drawing the open side of the assembly in the assembled state; a cleaning and drying apparatus C for cleaning and drying the assembly; a painting and drying apparatus D for painting and drying the assembly; and a bracket fixing apparatus E, F for fixing a fixing bracket to the assembly.



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CLAIMS

[Claim(s)]

[Claim 1] The body set attaching part which turns said opening side upward and supports the body components which have the space which carries out opening to an end side inside in the shape of abbreviation erection. In the condition of having fitted in and having attached opening of said cistern to the body components which were equipped with the cistern which has opening which can fit into a seal condition to the periphery of the body components supported to this body set attaching part at the pars basilaris ossis occipitalis, and were supported by the body set attaching part While making a liquid supply and store on the pars basilaris ossis occipitalis of this cistern and inserting and building components, such as a partition object and diaphragm, into the interior and opening of said body component In consecutiveness of the components inclusion and liquid enclosure equipment which a liquid is made to flow into the interior and are enclosed with it, and said components inclusion and liquid enclosure equipment In consecutiveness of the body collimator which carries out spinning of the opening side of these body components so that each part article which built into these body components the assembly of the aforementioned nest condition transported from this equipment may be fixed and the seal of the opening may be carried out, and a body collimator In consecutiveness of the washing dryer which washes and dries said assembly after the spinning taken out from this equipment, and said washing dryer In consecutiveness of the paint dryer which supports said assembly after desiccation pivotable, and is painted and dried while making it rotate, and this paint dryer It has at least one bracket attachment equipment which carries out attachment immobilization of the bracket for attachment to the member by the side of a car body and an engine to said assembly after paint desiccation. An assembly facility of liquid filled system vibrationproofing mounting characterized by being arranged and becoming as each of these equipments make the letter of the flat-surface abbreviation for U characters.

[Claim 2] The assembly facility of liquid filled system vibrationproofing mounting according to claim 1 with which it comes to arrange two, the bracket caulking equipment which fixes the bracket for attachment by the side of a car body according to caulking structure to the body components of said assembly as said bracket attachment equipment, and the equipment with a bracket group which fixes the bracket for attachment by the side of an engine with conclusion means, such as a bolt and a nut, to said body component.

[Claim 3] Where a liquid is stored on the liquid feeding-and-discarding means for making a liquid supply and discharge on said pars basilaris ossis occipitalis in the condition of having attached said cistern to body components, and the pars basilaris ossis occipitalis in said cistern, said components inclusion and liquid enclosure equipment An assembly facility of liquid filled system vibrationproofing mounting according to claim 1 or 2 which comes to have the components inclusion robot which divides to said body component in a liquid, and performs nest actuation of components, such as the body and diaphragm.

[Claim 4] An assembly facility of liquid filled system vibrationproofing mounting according to claim 3 as for which is constituted and said components inclusion robot's actuation becomes said cistern so that it may come to prepare a valve means suppress pulsation of an oil level in this oil-level detection tubing and may be controlled based on the detecting signal of oil-level height with this oil-level detection tubing, while oil-level detection tubing which detects the oil-level height at the time of liquid supply of a up to [a pars basilaris ossis occipitalis] is formed successively.

[Claim 5] An assembly facility of liquid filled system vibrationproofing mounting given in any 1 term of claims 1-4 which is established and becomes opening of said cistern pars basilaris ossis occipitalis so that the annular seal member flexibly attached to body components may be attached by the screwing means from the inferior-surface-of-tongue side to a pars basilaris ossis occipitalis and the screwing actuation of this seal member can be carried out from a top-face side.

[Claim 6] An assembly facility of liquid filled system vibrationproofing mounting given in any 1 term of claims 1-5 which come to install the drawing robot which performs drawing of the assembly after migration of drawing of the assembly from this components inclusion and liquid enclosure equipment, and the assembly to a body collimator, and the diaphragm from a body collimator one by one between said components inclusion and liquid enclosure equipment, and a body collimator.

[Claim 7] The assembly facility of liquid filled system vibrationproofing mounting according to claim 6 with which it comes to arrange the stock base which stocks temporarily the assembly picked out from this components inclusion and liquid enclosure equipment by said drawing robot near the inside of U typeface arrangement between said body collimators and said washing dryers.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the assembly facility of liquid filled system vibrationproofing mounting used for mainly supporting the engine for automobiles etc. in vibrationproofing.

[0002]

[Description of the Prior Art] As mounting which supports so that the vibration may not be made to transmit to a car body, the engine of an automobile etc. so that it may illustrate to drawing 19 The rubber elasticity object 3 and diaphragm 4 as the tubed body metallic ornaments 2 and a vibrationproofing base a part of interior wall nothing and the interior of a body which enclosed the liquid With the partition object 5, divide into the up-and-down liquid rooms 6a and 6b, constitute, make it open for free passage by the orifice 7 which divides both the liquid rooms 6a and 6b, and it has on the body 5, and according to for example, the vibrationproofing effectiveness of liquid flow resistance or the rubber elasticity object 3 by the orifice 7 Liquid filled system vibrationproofing mounting it was made to decrease and absorb vibration is known, as for this vibrationproofing mounting, attachment **** use of the bracket 9 for attachment by the side of a car body or the bracket 90 for attachment by the side of an engine is carried out.

[0003] To end side opening of the tubed body metallic ornaments 2, while vibrationproofing mounting which enclosed such a liquid carries out vulcanization adhesion of the rubber elasticity object 3 A liquid is enclosed with the interior, while carrying out vulcanization adhesion of the fixing metal 8 which has screw hole 8a for attachment on this rubber elasticity object 3, forming in the interior the body components 1 which have the space for enclosing a liquid and incorporating the partition object 5 and the components of diaphragm 4 grade to this body component 1. And since the incorporated components are fixed, while carrying out spinning of the opening side of body components, caulking immobilization of the edge is carried out, washing for removing the liquid and dirt which have adhered further is performed, and paint required after the desiccation is performed. After this paint dries, the bracket 9 for attachment by the side of a car body and the bracket 90 for attachment by the side of an engine attach with caulking structure and/or press fit structure, or the conclusion means of the bolt 91 grade for attachment screwed to said screw hole 8a for attachment, and are fixed.

[0004] In a series of processes of the assembly of vibrationproofing mounting of the former and the above components inclusion and a liquid enclosure activity The process which uses a quite large cistern and holds body components into the posture of immersion ***** in liquid in this cistern, The components nest activity was done in liquid, setting up two or more processes, such as a nest process to the body components of components, such as a partition object and diaphragm, a caulking process which fixes the incorporated components, and a process which takes out incorporated mounting from a cistern, and making body components transport to each process in liquid.

[0005] Therefore, if the body diaphragm process that said cistern is quite long and follows this, washing, a painting process, etc. were arranged in the single tier, also when the whole assembly facility would become quite huge and the equipment of each process would have been temporarily arranged to L typeface, it was what needs a big installation tooth space as a whole.

[0006] furthermore, in question [that time amount since durations differ for every process activity although human manpower is reducible if it is made what was automated so that all the equipments of each process might be associated and it might operate, when becoming quite huge / the whole facility costs /, for example, desiccation is also needed at the process of washing or paint cannot take, the operating ratio as the whole assembly facility cannot fall on the contrary, and productivity cannot raise] **ed — **.

[0007] In order that this invention persons may use the process and equipment of the components inclusion to the aforementioned body components, and a liquid enclosure activity as a compact It is immersed into a liquid and do not perform body components, but a liquid is supplied while fitting in and attaching opening which fits in to the opening side of body components to the opening side of body components for every activity of components inclusion of this cistern using the cistern which it has at the pars basilaris ossis occipitalis. The approach and equipment which do components inclusion and a liquid enclosure activity were proposed (JP,11-230235,A).

[0008] Even if it uses this components inclusion and liquid enclosure equipment, what has arrangement [be / the same as usual / it] of the whole assembly facility of washing, subsequent paint, bracket attachment, etc., etc. is not enough in respect of the tooth space as the whole assembly facility, an operating ratio, etc., and the further improvement is called for in it.

[0009] This invention is made in view of the above, can carry out the arrangement configuration of the whole assembly facility of liquid filled system vibrationproofing mounting at a compact, and it is invented so that it can contribute to drastic reduction of facility costs, rationalization, and improvement in productivity.

[0010]

[Means for Solving the Problem] The body set attaching part which turns said opening side upward and supports the body components which this invention is an assembly facility of liquid filled system vibrationproofing mounting which solves the above-mentioned technical problem, and have the space which carries out opening to an end side inside in the shape of abbreviation erection. In the condition of having fitted in and having attached opening of said cistern to the body components which were equipped with the cistern which has opening which can fit into a seal condition to the periphery of the body components supported to this body set attaching part at the pars basilaris ossis occipitalis, and were supported by the body set attaching part While supplying a liquid on the pars basilaris ossis occipitalis of this cistern with a liquid feeding-and-discarding means suitably, making it store and inserting and building components, such as a partition object and diaphragm, into the interior and opening of said body component In consecutiveness of the components inclusion and liquid enclosure equipment which a liquid is made to flow into the interior and are enclosed with it, and said components inclusion and liquid enclosure equipment In consecutiveness of the body collimator which carries out spinning of the opening side of these body components so that each part article which built into these body components the assembly of the aforementioned nest condition transported from this equipment may be fixed and the seal of the opening may be carried out, and a body collimator In consecutiveness of the washing dryer which washes and dries said assembly after the spinning taken out from this equipment, and said washing dryer In consecutiveness of the paint dryer which supports said assembly after desiccation pivotable, and is painted and dried while making it rotate, and this paint dryer It has at least one bracket attachment equipment which carries out attachment immobilization of the bracket for attachment to the member by the side of a car body and an engine to said assembly after paint desiccation, and is characterized by being arranged and becoming, as each of these equipments make the letter of the flat-surface abbreviation for U characters.

[0011] In order according to the assembly facility of this liquid filled system vibrationproofing mounting to also carry out neither spinning nor caulking in a liquid rather than to immerse [and] components inclusion and liquid enclosure equipment in a liquid in body components not using a big cistern, it becomes possible to arrange the whole facility to a flat-surface abbreviation U typeface satisfactory. Therefore, the tooth space of the whole facility can be miniaturized, one operator is enabled to perform activity actuation with each equipment from a way side among U typeface arrangement, and there are also few motions in that case (movement magnitude), and they end. With, assembly operation of each process, such as components inclusion on body components and liquid enclosure, washing, paint, and bracket attachment, can be efficiently performed by the activity actuation from a way side among said U typeface arrangement.

[0012] It shall come to arrange two, the bracket caulking equipment which fixes the bracket for attachment by the side of a car body according to caulking structure to the body components of said assembly as above bracket attachment equipment, and the equipment with a bracket group which fixes the bracket for attachment by the side of an engine with conclusion means, such as a bolt and a nut, to said body component. A sequential anchoring activity is done without accompanying this by the migration which has distance in the both sides of the bracket for attachment by the side of a car body, and the bracket for attachment by the side of an engine.

[0013] Where a liquid is stored on the liquid feeding-and-discarding means for making a liquid supply and discharge on said pars basilaris ossis occipitalis in the condition of having attached said cistern to body components, and the pars basilaris ossis occipitalis in said cistern, especially said components inclusion and liquid enclosure equipment The thing which comes to have the components inclusion robot which divides to said body component into a reservoir liquid, and performs nest actuation of components, such as the body and diaphragm, is desirable. It also becomes possible to be able to supply body components to a body set attaching part, to be able to do a components inclusion activity by actuation of this components inclusion and liquid enclosure equipment by this, only by supplying each part article to the components set section, and starting it, and to automate combining actuation of a consecutive body collimator. Therefore, if supply of body components and each part article is performed, it will become possible easily to perform activity actuation with other equipments, such as washing, and paint or bracket attachment, for before next supply having time allowances, having made each equipment U typeface arrangement, and having made migration length to each equipment small conjointly. That is, one operator can operate each equipment and can work.

[0014] While oil-level detection tubing which detects the oil-level height at the time of liquid supply of a up to [a pars basilaris ossis occipitalis] to the aforementioned components inclusion and the cistern of liquid enclosure equipment is formed successively When it is constituted so that it may come to prepare a valve means to suppress pulsation of an oil level in this oil-level detection tubing and said components inclusion robot's actuation may be controlled based on the detecting signal of oil-level height with this oil-level detection tubing, An inclusion activity will be done without not producing the excess and deficiency of the liquid supply to a solution layer, and producing the pause by incorrect actuation of the robot which does components inclusion and a liquid enclosure activity.

[0015] Moreover, what is prepared and becomes opening of the pars basilaris ossis occipitalis in said cistern so that the annular seal member flexibly attached to body components may be attached by the screwing means from the inferior-surface-of-tongue side to a pars basilaris ossis occipitalis and the screwing actuation of this seal member can be carried out from a top-face side is desirable.

[0016] In this case, although the seal member attached in pars-basilaris-ossis-occipitalis opening of said cistern is replaced with the seal member which corresponds according to configuration modification of body components etc. on the occasion of a stage substitute of vibrationproofing mounting for assembly, since that screwing actuation can be performed from the top-face side of a cistern even if this seal member is attached with the screwing means from a bottom subordinate side side, that exchange can be performed easily. That is, a stage substitute can be performed easily and the time amount of shutdown can be shortened.

[0017] The thing which comes to install the drawing robot which performs drawing of migration of drawing of the assembly from this components inclusion and liquid enclosure equipment and the assembly to a body collimator and the assembly of diaphragm Ushiro from a body collimator one by one between said components inclusion and liquid enclosure equipment, and a body collimator is desirable.

[0018] That is, the aforementioned drawing robot can be used for migration to drawing and the body collimator of said assembly from components inclusion and liquid enclosure equipment, and a list, drawing of the assembly from a body collimator can be performed in them in a series of continuous operation corresponding to components inclusion or a liquid enclosure activity, and the activity can be well done on them.

[0019] The thing which comes to arrange the stock base which stocks temporarily the assembly picked out from this components inclusion and liquid enclosure equipment by said drawing robot near the inside of U typeface arrangement between said body collimators and said washing dryers is desirable. By this the assembly mechanically picked out from said body collimator one by one by the drawing robot Working hours can stock to supply to a consecutive washing dryer, with according to components inclusion and liquid enclosure equipment, and a body collimator, Even if there is a big difference in the working hours by the washing dryer and paint dryer of the consecutiveness, it is satisfactory, and the activity by each equipment can be separately started for every supply of an assembly.

[0020]

[Embodiment of the Invention] Next, it explains based on the example which shows the gestalt of operation of this invention to a drawing.

[0021] The sketch top view of the whole facility in which one example of the assembly facility which drawing 1 requires for this invention is shown, and drawing 2 are [the expansion front view of this equipment and drawing 4 of components inclusion and the expansion top view of a liquid enclosure equipment part, and drawing 3] the expansion side elevations of the important section of this equipment. Drawing 5 is the expansion front view which carried out the cross section of the cistern in which the outline of a cistern rise-and-fall means is shown.

[0022] In drawing 1 , A is equipment which divides into the body components 1 of liquid filled system vibrationproofing mounting for [of vibrationproofing mounting illustrated to drawing 19] assembly, and encloses a nest liquid for the body 5 or the components of diaphragm 4 grade.

[0023] The body set attaching part 10 which turns upward the body components 1 which have the space which carries out opening of this components inclusion and the liquid enclosure equipment A to an end side inside, and supports said opening side for them in the shape of abbreviation erection, It comes to have the cistern 20 which has the opening 22 which can fit into a seal condition to the periphery of the body components 1 supported to said body set attaching part 10 at the pars basilaris ossis occipitalis 21. In the condition of having fitted in and having attached the opening 22 of said cistern 20 to the body components 1 supported by the body set attaching part 10 Supply a liquid on the pars basilaris ossis occipitalis 21 of this cistern 20 with a liquid feeding-and-discarding means suitably, and it is made to store, and while inserting and building the partition object 5 and the components of diaphragm 4 grade into the interior and opening of the body components 1, it is constituted so that a liquid may be made to flow into the interior and it may enclose with it. Preferably, it is prepared so that it may illustrate, and it may be allotted possible [rise and fall of said cistern 20] and said opening 22 can be fitted in to the opening side of the body components 1 according to a descent operation. About the detailed structure of this equipment A, it mentions later.

[0024] B is a body collimator which carries out spinning of the opening side of the body components 1 so that each part article which built the assembly a of said components inclusion and components nest Ushiro in liquid enclosure equipment A into said body component 1 may be fixed and the seal of the opening may be carried out in said components inclusion and consecutiveness of liquid enclosure equipment A. [0025] C is a washing dryer which washes and dries said assembly a after the spinning taken out from this equipment in consecutiveness of said body collimator B, and D is a paint dryer which paints with means, such as brush coating, and is dried in consecutiveness of said washing dryer C, making it rotate in support of said assembly a after desiccation pivotable.

[0026] The bracket caulking equipment as bracket-attachment equipment which carries out attachment immobilization of the bracket 9 for

attachment to the member by the side of a car body according to press fit and caulking structure to said assembly a painted in consecutiveness of said paint dryer C, and F of E are equipment with a bracket group as bracket-attachment equipment which carries out attachment immobilization of the bracket 90 for attachment to the member by the side of an engine with means, such as a nut bundle, to said assembly a.

[0027] G is a drawing robot stationed between said components inclusion, and liquid enclosure equipment A and body collimator B. It takes out from components inclusion and liquid enclosure equipment A, maintaining to a horizontal position so that it may operate in relation to said components inclusion and nest actuation of liquid enclosure equipment A, the chuck of the assembly a of a components nest condition may be carried out by the chuck section at the tip of a hand and a mounting fluid object may not be poured. It is prepared so that it may transport to the following body collimator B.

[0028] H is a stock base for stocking temporarily the assembly a after the spinning taken out from said body collimator C by the drawing robot G.

[0029] And each aforementioned equipment A-F ****s the equipment transverse plane which is on an actuation side so that the letter of the flat-surface abbreviation for U characters may be made in a predetermined tooth space like drawing 1 inside, and is arranged. Especially arrangement of this flat-surface abbreviation U typeface is considered as comparatively compact arrangement so that the space where one operator operates said each equipment A-F in the way section, and can work by the minimum motion in it among U typeface arrangement may be held, while it holds spacing of extent which does not check the activity for every equipment between said each equipment A-F. In the case of drawing, along with the way side, it is arranged also about said drawing robot G and the stock base H among arrangement of said flat-surface abbreviation U typeface.

[0030] Hereafter, it explains in more detail about the configuration of each aforementioned equipment A-F etc.

[0031] First, components inclusion and liquid enclosure equipment A are explained. 10 is a body set attaching part fixed in support of said body component 1 on a machine stool 11 at a predetermined set location. This body set attaching part 10 has the carrier branch material 13 of the body components 1 fixed to some plates 12. For example, the rubber elasticity object 3 as a vibrationproofing base is fixed with a vulcanization adhesion means to end side opening of the body components 1 2 used for vibrationproofing mounting of drawing 20, i.e., tubed body metallic ornaments. Furthermore, fixing metal 8 is fixed on this rubber elasticity object 3, opening is turned upward and the body components 1 which have a building envelope for enclosing a liquid can be supported now.

[0032] 14 has come to be able to carry out supply installation of the partition object 5 and diaphragm 4 which are the components set fixture set up on said plate 12 near said carrier branch material 13, and are the components inside vibrationproofing mounting in the orientation set up beforehand.

[0033] The body set attaching part 10 is equipped with a fixed means 15 to hold the body components 1 supported by this carrier branch material 13 in the fixed condition as shown in drawing 4 and drawing 10 R0-12.

[0034] The cylinder equipment 16 to which this fixed means 15 operates according to the oil pressure force or the pneumatics force, in the condition that consisted of chuck equipment 17 fixed to the front end section of the output rod 16a, and the body components 1 were supplied on the carrier branch material 13 of the body set attaching part 10. If operation is started by button grabbing etc., cylinder equipment 16 operates and said chuck equipment 17 moves forward, and it is prepared so that the chuck of the body components 1 may be carried out with chuck equipment 17 and fixed maintenance can be carried out at a position.

[0035] Said chuck equipment 17 is formed possible [the pieces 18a and 18a of a pawl which make a pair in a vertical location, respectively, and closing motion of 18b and 18b], and the upside pieces 18a and 18a of a pawl are formed so that said body component 1 may be pinched from both sides. By engaging with the engagement members 19 and 19 of the typeface of abbreviation KO arranged by carrying out phase opposite at the both sides of the carrier branch material 13, the lower pieces 18b and 18b of a pawl are formed so that the variation rate to the upper part of chuck equipment 17 may be regulated.

[0036] In consideration of a stage substitute of vibrationproofing mounting for assembly, said carrier branch material 13 is constituted so that it can respond to the gestalt of two or more body components 1. For example, as shown in drawing 13, it is prepared by spacer 13a for height adjustment so that height can be adjusted.

[0037] 20 is the cistern supported possible [rise and fall] by the cistern rise-and-fall means 30 [above said body set attaching part 10].

[0038] To the body set attaching part 10, the cistern rise-and-fall means 30 drops a cistern 20, where set immobilization of the body components 1 is carried out, it is attached to the body components 1 like the after-mentioned, and it is established so that it may secede from the body components 1 and a cistern 20 may be raised after each part article inclusion completion. That is, a motion of said fixed means 15 is interlocked with, and it operates.

[0039] The aforementioned cistern rise-and-fall means 30 is constituted using a 1 shaft actuator. For example, the guide 32 perpendicularly arranged on the front face of the support substrate 31 set up on the machine stool 11 to machine stool 11 top face in drawing, it has the **** shaft 35 in which gets into gear to the slider 33 which fitted into this guide 32 and was formed possible [rise and fall], and this slider 33, and a rotation drive is carried out by the driving means 34 of a servo motor etc. When it ****s by actuation of said driving means 34 and a shaft 35 rotates, it is prepared so that a slider 33 may move up and down (rise and fall). said cistern 20 is formed in the tie-down plate 36 fixed to this slider 33 so that a cistern 20 may go up and down with vertical movement of attachment ** and said slider 33. This cistern rise-and-fall means 30 is constituted so that the rate at the time of attaching a cistern 20 to the body components 1, a location, etc. can be controlled thinly.

[0040] It can also prepare so that you may make it go up and down the slider 33 besides the above with other means, such as cylinder equipment.

[0041] The opening 22 which can fit into a correspondence part with said body set location in a pars basilaris ossis occipitalis 21 to the up periphery of the body components 1 at a seal condition is formed so that said cistern 20 may be expanded to drawing 5 and drawing 6 and may be shown. The seal members 50, such as oil seal, are attached in the inner circumference of this opening 22, and it is prepared in it so that it may attach flexibly to the periphery section of the body components 1 and a seal condition can be held by descent of a cistern 20. And in the condition of having attached to the body components 1, the liquid of the specified quantity can be stored now on said pars basilaris ossis occipitalis 21.

[0042] Said especially seal member 50 is attached possible [desorption] by the screwing means from an inferior-surface-of-tongue side to said pars basilaris ossis occipitalis 21, and according to the class of vibrationproofing mounting for assembly, especially the gestalt of the body components 1, it is prepared so that the gestalt corresponding to it and the seal member of size can be given in exchange. In this invention, it is prepared so that screwing actuation for this exchange can be performed from a top-face, i.e., the upper part of cistern 20, side.

[0043] As shown in drawing 6 and drawing 7, specifically, the seal object 52 of a cross-section abbreviation U typeface which becomes the inner circumference of the annular periphery object 51 which consists of rigid material, such as metals, such as stainless steel and aluminum, or synthetic resin, from a rubber elasticity object comes to fix said seal member 50 with vulcanization adhesion, a press fit means, etc. A spiral rib is formed in the peripheral face of said periphery object 5, and it can screw now to opening 22 inner circumference of the cistern pars basilaris ossis occipitalis 21. In the lower limit section of said periphery object 51, it has the flange-like section 53 jutted out over the method of outside, and in the condition that this periphery object 51 screwed and attached in opening 22 inner circumference, it is formed so that the annular sealant 54 can be pinched between pars-basilaris-ossis-occipitalis 21 inferior surfaces of tongue.

[0044] And in the flat surface, the groove notching 55 for screwing actuation is formed in the top face of a pars basilaris ossis occipitalis 21 to the axial center on the top face of said periphery object 51 which **** in the shape of a protrusion at the location of the direction of a cross joint, and, thereby, screwing actuation which uses the fixture for screwing actuation can be performed now from a top-face side. Thereby, exchange of the seal member 50 for a stage substitute can be performed easily. And since said seal member 50 is screwed and attached from an inferior-surface-of-tongue side to the pars basilaris ossis occipitalis 21 of a cistern 20, it can hold the sealant 54 of a screwing part as usual.

[0045] Drawing 8 and drawing 9 show the example which changed said seal member 50 according to modification of the body components 1.

[0046] In this example, the periphery object 51 of said seal member 50 has the inner flange 56 for positioning to which the upper limit section of the body components 1 which fit into said seal object 52 contacts the upper limit section inner circumference which **** in the shape of a protrusion from pars-basilaris-ossis-occipitalis 21 top face, and the groove notching 55 for screwing actuation of the direction of a cross joint is formed in the top face of the periphery object 51 containing this inner flange 56 to the axial center. The body components 1 which fit into the inside can be positioned by this, as a result the attachment condition of a cistern 20 and the body components 1 can always be uniformly held now.

[0047] As notching 55 for screwing actuation formed in a top face, according to the gestalt of the fixture for screwing actuation, a configuration like a circular hole and other throats may be made, and the location and spacing, and a number can also be set as arbitration also in the seal member 50 of which said example. When consisting of groove notching of the direction of a cross joint as shown in drawing, screwing actuation can be easily carried out using the fixture of a minus configuration. Moreover, circulation of liquid also becomes good.

[0048] Moreover, it sets in the example to illustrate as a feeding-and-discarding means to supply a liquid on the pars basilaris ossis occipitalis 21 of said cistern 20, and to discharge. On the other hand, the aforementioned opening 22 of the longitudinal direction of a cistern 20 is formed in the pars basilaris ossis occipitalis 21 of one end. To the part by the side of the part except near this opening 22, for example, the other end of a longitudinal direction The crevice 24 which drops caudad and enabled it to store the liquid W of requirements is formed. The restoration float 25 which has heights part 25a which can furthermore be inserted in a crevice 24 in an inferior-surface-of-tongue side is connected with cylinder equipment 26, and it is prepared so that it may go up and down by actuation of this cylinder equipment 26. According to a rise-and-fall operation of this restoration float 25 It is constituted so that the liquid W currently stored in said crevice 24 can be discharged from supply or a pars basilaris ossis occipitalis 21 on a pars basilaris ossis occipitalis 21.

[0049] That is, by said restoration float 25 descending and inserting in a crevice 24, when the liquid W in a crevice 24 is extruded on a pars basilaris ossis occipitalis 21, and it is stored by predetermined oil-level height and said restoration float 25 goes up, the liquid W on said pars basilaris ossis occipitalis 21 carries out a ** style into a crevice 24.

[0050] At the time of descent insertion of the restoration float 25, on the pars basilaris ossis occipitalis 21 besides this restoration float 25, the volume of the aforementioned crevice 24 and the volume of the restoration float 25 are set up so that predetermined oil-level height required for air end actuation of the components mentioned later etc. can be secured.

[0051] 27 is supply tubing connected with supply means (not shown), such as a pump which supplies a liquid to said cistern 20, and is connected [pars basilaris ossis occipitalis / of said crevice 24]. Since liquids will decrease in number for every one liquid enclosure activity, the supply means of a liquid is established so that the liquid more than fixed can be stored on the pars basilaris ossis occipitalis 21 of said cistern 20 at the time of the liquid supply by the feeding-and-discarding means of said liquid, i.e., the liquid supply by descent of the restoration float 25, and a liquid may be suitably supplied in a cistern 20. Usually, the pump as a liquid supply means is formed so that it may operate based on the detection result of the oil-level height mentioned later. The exhaust port (not shown) for making the liquid in a cistern 20 discharge in the cases, such as maintenance check and washing, is also prepared in the pars basilaris ossis occipitalis of said crevice 24.

[0052] In addition, although various means, such as using the feeding-and-discarding device by other, for example, a pump, means [above] as a feeding-and-discarding means of the liquid to the pars-basilaris-ossis-occipitalis 21 top of a cistern 20, can be used, a device is easy, moreover constituting as mentioned above operationally can ensure [quickly and] a feeding-and-discarding operation of a liquid, and it is especially desirable.

[0053] 40 is constituted so that the components inclusion robot's 60 actuation which is oil-level detection tubing which detects the oil-level height at the time of liquid supply of a up to [the pars basilaris ossis occipitalis 21 by the aforementioned liquid feeding-and-discarding means], and is later mentioned through the device control section based on the detecting signal of oil-level height with this oil-level detection tubing 40 may be controlled. This oil-level detection tubing 40 is formed so that it may come to prepare the level sensor 43 which approaches this transparence tube part 42 and detects the oil-level height of an influent object and can go up and down with a cistern 20, while having the piping 41 for [it was connected / for / lower part / cistern 20 / possible / a liquid inflow] detection of ***** and forming the transparence tube part 42 in a part of this piping [at least] 41 for detection. 44 is the supporter material of said level sensor 43.

[0054] The chuck equipment 62 which 60 is a components inclusion robot which consists of a multiaxial articulated robot etc., and has the pieces 63 and 63 of a pawl of the pair which can be freely opened and closed to the point of the hand 61 is formed. This components inclusion robot 60 is formed so that it is controlled based on a detecting signal with said oil-level detection tubing 40, and it starts actuation with the signal from the device control section which received that detecting signal when it detected that the oil-level height at the time of liquid supply of a up to [the pars basilaris ossis occipitalis 21 of said cistern 20] reached fixed level, and actuation may be suspended, when said oil-level height is below fixed level.

[0055] The location of the body components 1 which this components inclusion robot 60 was set on the body set attaching part 10, and were fixed, Physical relationship, such as a location of each part article set to the components set fixture 14, and height of the cistern 20 attached to the body components 1, oil-level height on the pars basilaris ossis occipitalis 21 in this cistern 20, It responds to said oil-level height further. descent of a cistern 20 — attachment actuation with the body components 1 — The chuck of the partition object 5 set to the above-mentioned components set fixture 14 or the components of diaphragm 4 grade is carried out with the sequential aforementioned chuck equipment 62. While making it move above said cistern 20 attached to the body components 1, it is made to descend in a correspondence location with the body components 1. It inclines in predetermined air end actuation, for example, the components which carried out the chuck, and teaching is set up and carried out so that air end actuation and the nest actuation mentioned later of being immersed into a liquid with a posture may be performed. It is prepared so that the actuation may furthermore be amended if needed.

[0056] In addition, this components inclusion and liquid enclosure equipment A are intermediary **** [as] which will be in a standby condition in preparation for supply of the following body components 1, and will operate a start button etc. for every supply of the body components 1 if a series of components inclusion actuation about one product is completed. 70 is a control unit equipped with the device control section and a start button, an earth switch, etc. of components inclusion and liquid enclosure equipment A.

[0057] Moreover, body collimator B is equipped with the attaching part 101 which makes the opening side the upper part sense, and supports the assembly a of a components inclusion condition which is picked out from the above-mentioned components inclusion and liquid enclosure equipment A by the drawing robot G, and is transported, and the drawing-die section 103 which goes up and down with cylinder equipment 102 in the upper part as shown in drawing 14. The drawing-die section 103 is constituted so that spinning which makes the diameter of the opening side of the tubed body metallic ornaments 2 which constitute the body components 1 in said assembly a

reduce can be performed with the descent operation. Since the same thing as the collimator better known [the mold structure of this drawing-die section 103] than before or existing can be used, that detailed explanation is omitted.

[0058] It is desirable for the drawing robot G formed between said components inclusion, and liquid enclosure equipment A and body collimator B to do the chuck of the assembly a by the chuck section 107 which it has at the tip of a hand 106, and to pick it out from components inclusion and liquid enclosure equipment A, to be prepared so that it may transport to the following body collimator B, but to prepare so that the chuck of the assembly a after spinning may be carried out and it may be further taken out from body collimator B. In this case, the taken-out assembly a is formed so that it may drop into the stock base H prepared along with the inside of U typeface arrangement.

[0059] Moreover, the washing dryer C of consecutiveness of said body collimator B The rotation cradle 111 of a basket form which holds the assembly a which is picked out one piece at a time from the stock base H, and is supplied so that it may sketch in drawing 15 . The foreign matters and dirt which came to have the injection nozzle 112 which injects the warm water around 80 degrees C to the assembly a on this rotation cradle 111, and have adhered to the periphery of Assembly a by this warm water injection, such as some mounting fluid objects and oil, are removed. The ventilation means (not shown) for carrying out desiccation after washing early can also be established if needed. Moreover, it can also prepare so that it may support in the shape of abbreviation erection by said rotation cradle 111. An operator does operation actuation of it by actuation of the start button prepared in the control unit 110, when said assembly a supplies this washing dryer C. Operation time is suitably set up according to the effectiveness of washing etc.

[0060] Said stock base H consists of a chute which inclined toward the washing dryer C side from said body collimator B side along with the inside of U typeface arrangement, and can stock now two or more assemblies a in the lower part. An operator supplies one stocked assembly a at a time to the sequential washing dryer C. As a stock base H, you may be the thing of a mere cube type.

[0061] The paint dryer D is equipped with the rotation susceptor 121 which supports Assembly a pivotable focusing on the axial center in the state of erection, and can perform predetermined paint now by the brush coating by the operator to the assembly A which carries out support **** rotation by this rotation susceptor 121 so that it may sketch in drawing 16 . 122 is a ventilation means for desiccation after paint, and covering whose 123 can ventilate now from diffuser 122a and prevents diffusion of the droplet at the time of paint, and 124 are saucers.

[0062] In addition, as a paint means, spray painting is also possible and the nozzle member 125 for it can also be put side by side. However, since the device for spray painting, its controlling mechanism, etc. become complicated and become cost quantity in that case, as for this paint, it is desirable to consider as the brush coating by the operator as mentioned above. 120 is a control unit which operates [dryer / D / the / paint / want / to make it].

[0063] The bracket caulking equipment E as 1st bracket attachment equipment is equipped with the type section 133 for caulking which goes up and down said assembly a with cylinder equipment 132 at an erection condition in support, the supporter 131 which places fixing metal 8 upside down preferably, and is supported in the erection condition, and its upper part so that it may sketch in drawing 17 . The type section 133 for caulking is formed so that the bracket 9 for attachment by the side of a car body may be pressed fit to the assembly a supported to said supporter 131 and the caulking immobilization of the edge can be carried out according to the descent operation.

[0064] That is, said bracket 9 for attachment is constituted so that caulking immobilization of the edge may be carried out, while it comes to attach bracket piece 9b which has a hole for bolt conclusion to one and said cylinder part 9a is pressed fit in the body metallic ornaments 2 by descent operation of said type section 133 for caulking at cylinder part 9a pressed fit to the body metallic ornaments 2 in Assembly a as shown in drawing 1919 . Since the same thing as equipment better known [the structure of this type section 133 for caulking] than before or existing can be used, that detailed explanation is omitted. 135 is a control unit equipped with a start button etc.

[0065] Moreover, the bracket inclusion equipment F as 2nd bracket attachment equipment turned the fixing metal 8 in said assembly a up, and is equipped with the supporter 141 supported in the erection condition, and the bolt runner equipment 143 which goes up and down with cylinder equipment 142 in the upper part so that it may sketch in drawing 18 . Bolt runner equipment 143 has the runner body 144 which holds the bolt 91 for attachment in the lower limit section, and rotates in it. In the condition of having set the bracket 90 for attachment by the side of an engine to said fixing metal 8 of the assembly a supported to said supporter 141 By descending, while the runner body 144 rotates, where the bolt 91 for attachment is held, it is prepared so that said bolt 91 may be bound tight by the predetermined bolting force from said bracket 90. 145 is a control unit equipped with a start button etc.

[0066] In addition, the bolt for attachment is protruded on fixing metal 8, and a bracket 90 can also be fixed by the nut bundle to this bolt for attachment. In this case, said bolt runner equipment 143 is constituted as nut-runner equipment.

[0067] In addition, also making it hold manually in the lower limit section of the runner body 144 can also make said bolt 91 for attachment, nut, etc. hold with an automatic supply means. Moreover, in case an operator does supply of the assembly a to said supporter 141, and the set activity of a bracket 90, temporary tightening of said bolt 91 can also be carried out to coincidence. Since the same thing as equipment better known [the bolting device of bolt runner equipment 143 or nut-runner equipment etc.] than before or existing can be used, the detailed explanation is omitted.

[0068] The bracket caulking equipment E as above bracket attachment equipment and the equipment F with a bracket group may omit either depending on the gestalt of liquid seal close type vibrationproofing mounting.

[0069] The assembly facility by the above-mentioned configuration explains the case where liquid filled system vibrationproofing mounting of drawing 19 is assembled.

[0070] First, in subassembly and liquid enclosure equipment A, the body components 1 which have space inside and carry out opening to an end side are changed into the abbreviation erection condition of having turned said opening up, and are supplied and set on the carrier branch material 13 of the body set attaching part 10. Moreover, the components of the partition object 5 and diaphragm 4 grade are laid in the orientation on the components set fixture 14.

[0071] In this way, if operation of equipment is started by start button actuation etc., in the body set attaching part 10, the cylinder equipment 16 of the fixed means 15 will operate, the chuck equipment 17 at a tip will move forward, the chuck of said body component 1 will be carried out with chuck equipment 17, and fixed maintenance will be carried out at said set location.

[0072] It is attached so that a seal condition may be held through the seal member 50 which fitted into the periphery of said body components 1 which the opening 22 which the cistern rise-and-fall means 30 will operate next if the body components 1 are fixed, a cistern 20 descends in a slider 33 like the chain line of drawing 5 by the drive of a driving means 34, and it has at the pars basilaris ossis occipitalis 21 is aligned by this, and are held, and was prepared in this opening 22. When it has the inner flange 56 in the upper limit section inner circumference which **** from pars-basilaris-ossis-occipitalis 21 top face like drawing 8 at this time, it is positioned because the upper limit section of the body components 1 which fitted into said seal object 52 contacts, and the attachment condition by fitting always becomes fixed. A touch area with the liquid of the body components 1 also decreases.

[0073] After the liquid W of the specified quantity is stored in this cistern 20 by the crevice 24 established in a part of that pars basilaris ossis occipitalis and the aforementioned attachment is completed to it, the restoration float 25 descends by actuation of cylinder equipment 26, and when heights part 25a inserts in said crevice 24 like the chain line of drawing 5 , the liquid W in a crevice 24 is extruded and supplied on the pars basilaris ossis occipitalis 21 into which said body component 1 has fitted. This flows into the building envelope 9 of the body components 1 from the opening edge of the body components 1 which the liquid is ****(ing) from the pars basilaris ossis occipitalis 21, and it is stored by predetermined oil-level height required for a components nest.

[0074] Moreover, when the oil level of said liquid W reaches fixed level at the time of supply of the liquid to said pars-basilaris-ossis-occipitalis 21 top, Operate the components inclusion robot 60 and the chuck of the components of the partition object 5 by which the supply set is carried out, and diaphragm 4 grade is carried out to the predetermined location on the components set fixture 14 with the chuck equipment 62 at sequential hand 61 tip. After move onto said cistern 20, descending, holding into a predetermined inclination posture, inclining to the liquid W stored by said cistern 20, carrying out being immersed with a posture etc. and performing the air end, it returns horizontally in Liquid W, and inserts and incorporates from the opening edge of said body component 1. Under the present circumstances, if needed, using the object for partition object wearing, and the cylinder 65 for diaphragm wearing, as it pushes into a predetermined location, it can include in it. Moreover, said components inclusion robot's 60 hand 61 returns to the original location, and a next nest operation is equipped with it.

[0075] If the nest of each part article is completed as mentioned above, the restoration float 25 will go up and Liquid W will be discharged by actuation of cylinder equipment 26 from ***** and a pars basilaris ossis occipitalis 21 in connection with this in a crevice 24. Then, said cistern 20 is raised and it is made to break away from the body components 1 by actuation of the cistern rise-and-fall means 30. Moreover, the chuck operation by the chuck equipment 17 of the fixed means 15 is canceled, and chuck equipment 17 is returned to the original location with cylinder equipment 16.

[0076] The drawing robot G will operate, a chuck is carried out by the chuck section 107 which has the assembly a of the components inclusion condition currently supported by said body set attaching part 1 at the tip of a hand 106, if a series of aforementioned actuation is completed, it will take out in the condition of having held to the horizontal position, and will transport to the following body collimator B so that a liquid may not be made to flow out, and an opening side is made into the upper part sense, and an attaching part 101 is made to support it. In this way, the drawing robot's G hand 106 secedes from Assembly a. The seal of the edge is carried out so that spinning which makes the diameter of the opening side of the tubed body metallic ornaments 2 in said assembly a reduce when the drawing-die section 103 descends may be performed and the liquid spill of the components, such as an incorporated partition object and diaphragm, may not be fixed and carried out by actuation of cylinder equipment 102 in this condition. If this spinning is completed, while said drawing-die section 103 will go up, it operates again, and said drawing robot G does the chuck of the assembly a on said attaching part 101, takes it out, and drops into the stock base H for supply to the below-mentioned washing dryer C. The drawing robot G returns to the original position in readiness.

[0077] The assembly [finishing / spinning] a taken out by the stock base H is stocked suitably here, and an operator supplies and washes it at a time to the washing dryer C suitably at one piece according to the progress condition of each consecutive equipment etc. That is, Assembly a is supplied on the rotation cradle 111 of a basket form, operation is started by actuation of a start button etc., and fixed time amount warm water is injected and washed, rotating said cradle. It sets during the 1 scheduled time after washing, and it dries, ventilating as occasion demands. The dry assembly a is picked out from this washing dryer C, and is stocked in the supply standby section (not shown) for supplying the following paint dryer D as it is, or supplying the paint dryer D.

[0078] An operator supplies at a time one assembly a which was washed as mentioned above and dried to the rotation susceptor 121, and makes an erection condition support it in the paint dryer D. In this way, Assembly a is rotated with the rotation susceptor 121 by start button actuation, and predetermined paint is carried out to the predetermined part, for example, fixing metal etc. This paint is performed by carrying out brush coating to the assembly a which an operator rotates. If paint is completed, it will be made to dry by the ventilation from the diffuser 122 for ventilation, moreover, if needed, it takes out from said rotation susceptor 121, and places on the base — it can also be made to dry Depending on the progress condition of an activity with consecutive equipment, it may stock as it is.

[0079] If paint and desiccation of this assembly a are completed, said assembly a will be supplied to the bracket caulking equipment E for the next bracket attachment. With this bracket caulking equipment E, while supporting said assembly a in the erection condition with a supporter 131, cylinder part 9a of the bracket 9 for attachment is set to the condition of having fitted in partially to the body metallic ornaments 2, to this assembly a. In this condition, with cylinder equipment 132, cylinder part 9a of said bracket 9 for attachment is pressed fit for the type section 133 for caulking to the body metallic ornaments 2 according to a descent operation, and caulking immobilization of that edge is carried out further. And said assembly is taken out after a rise of the mold 133 for caulking.

[0080] Then, in attaching the bracket 90 for attachment by the side of an engine further, the aforementioned assembly a is supplied to the equipment F with a bracket group as 2nd bracket attachment equipment, and to the supporter 141 with which this equipment F with a group is equipped, the fixing metal 8 in said assembly a is turned up, and it supports at an erection condition. And while fitting the mounting hole section into fixing metal 8 and setting the bracket 90 for attachment to it, the bolt 91 for attachment is set to the runner body 144 of bolt runner equipment 143, or temporary tightening is carried out to screw hole 8a for attachment. In this condition, bolt runner equipment 143 is dropped by actuation of cylinder equipment 142, said bolting nut 91 is bound tight with the rotating runner body 144, and said bracket 90 is fixed. And said assemblies a are taken out and collected after a rise of bolt runner equipment 143.

[0081] Thereby, as shown in drawing 19, it can divide into the interior of the body components 1, a nest and a liquid can be enclosed for the body 5 or the components of diaphragm 4 grade, predetermined paint can be performed, and liquid seal close type vibrationproofing mounting besides attachment can be assembled for the bracket 9 for attachment by the side of a car body, and the bracket 90 by the side of an engine at the periphery section and the edge of the body components 1.

[0082] By having arranged the whole facility to the flat-surface abbreviation U typeface especially, the tooth space of the whole facility can be miniaturized, one operator is enabled to perform activity actuation with each equipment from a way side among U typeface arrangement, and there are also few motions in that case (movement magnitude), and they end. And the process of spinning can be continuation-ized in components inclusion on body components and liquid enclosure, and a list, and the activity actuation by one operator from a way side can perform each equipment efficiently among said U typeface arrangement by having made it operate each process, such as subsequent washing, paint, and bracket attachment, separately.

[0083]

[Effect of the Invention] By having arranged the whole assembly facility to the flat-surface abbreviation U typeface using the components inclusion of a method and liquid enclosure equipment which attach a cistern to the opening side of body components according to this invention, as described above, the arrangement tooth space of an assembly facility of liquid filled system vibrationproofing mounting can be miniaturized, and drastic reduction of facility costs, rationalization, and improvement in productivity can be aimed at.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the assembly facility of liquid filled system vibrationproofing mounting used for mainly supporting the engine for automobiles etc. in vibrationproofing.

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EFFECT OF THE INVENTION

[Effect of the Invention] By having arranged the whole assembly facility to the flat-surface abbreviation U typeface using the components inclusion of a method and liquid enclosure equipment which attach a cistern to the opening side of body components according to this invention, as described above, the arrangement tooth space of an assembly facility of liquid filled system vibrationproofing mounting can be miniaturized, and drastic reduction of facility costs, rationalization, and improvement in productivity can be aimed at.

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TECHNICAL PROBLEM

[Description of the Prior Art] As mounting which supports so that the vibration may not be made to transmit to a car body, the engine of an automobile etc. so that it may illustrate to drawing 19 The rubber elasticity object 3 and diaphragm 4 as the tubed body metallic ornaments 2 and a vibrationproofing base a part of interior wall nothing and the interior of a body which enclosed the liquid With the partition object 5, divide into the up-and-down liquid rooms 6a and 6b, constitute, make it open for free passage by the orifice 7 which divides both the liquid rooms 6a and 6b, and it has on the body 5, and according to for example, the vibrationproofing effectiveness of liquid flow resistance or the rubber elasticity object 3 by the orifice 7 Liquid filled system vibrationproofing mounting it was made to decrease and absorb vibration is known. as for this vibrationproofing mounting, attachment **** use of the bracket 9 for attachment by the side of a car body or the bracket 90 for attachment by the side of an engine is carried out.

[0003] To end side opening of the tubed body metallic ornaments 2, while vibrationproofing mounting which enclosed such a liquid carries out vulcanization adhesion of the rubber elasticity object 3 A liquid is enclosed with the interior, while carrying out vulcanization adhesion of the fixing metal 8 which has screwhole 8a for attachment on this rubber elasticity object 3, forming in the interior the body components 1 which have the space for enclosing a liquid and incorporating the partition object 5 and the components of diaphragm 4 grade to this body component 1. And since the incorporated components are fixed, while carrying out spinning of the opening side of body components, caulking immobilization of the edge is carried out, washing for removing the liquid and dirt which have adhered further is performed, and paint required after the desiccation is performed. After this paint dries, the bracket 9 for attachment by the side of a car body and the bracket 90 for attachment by the side of an engine attach with caulking structure and/or press fit structure, or the conclusion means of the bolt 91 grade for attachment screwed to said screwhole 8a for attachment, and are fixed.

[0004] In a series of processes of the assembly of vibrationproofing mounting of the former and the above components inclusion and a liquid enclosure activity The process which uses a quite large cistern and holds body components into the posture of immersion ***** in liquid in this cistern, The components nest activity was done in liquid, setting up two or more processes, such as a nest process to the body components of components, such as a partition object and diaphragm, a caulking process which fixes the incorporated components, and a process which takes out incorporated mounting from a cistern, and making body components transport to each process in liquid.

[0005] Therefore, if the body diaphragm process that said cistern is quite long and follows this, washing, a painting process, etc. were arranged in the single tier, also when the whole assembly facility would become quite huge and the equipment of each process would have been temporarily arranged to L typeface, it was what needs a big installation tooth space as a whole.

[0006] furthermore, in question [that time amount since durations differ for every process activity although human manpower is reducible if it is made what was automated so that all the equipments of each process might be associated and it might operate, when becoming quite huge / the whole facility costs /, for example, desiccation is also needed at the process of washing or paint cannot take, the operating ratio as the whole assembly facility cannot fall on the contrary and productivity cannot raise] **ed -- **.

[0007] In order that this invention persons may use the process and equipment of the components inclusion to the aforementioned body components, and a liquid enclosure activity as a compact It is immersed into a liquid and do not perform body components, but a liquid is supplied while fitting in and attaching opening which fits in to the opening side of body components to the opening side of body components for every activity of components inclusion of this cistern using the cistern which it has at the pars basilaris ossis occipitalis. The approach and equipment which do components inclusion and a liquid enclosure activity were proposed (JP,11-230235,A).

[0008] Even if it uses this components inclusion and liquid enclosure equipment, what has arrangement [be / the same as usual / it] of the whole assembly facility of washing, subsequent paint, bracket attachment, etc., etc. is not enough in respect of the tooth space as the whole assembly facility, an operating ratio, etc., and the further improvement is called for in it.

[0009] This invention is made in view of the above, can carry out the arrangement configuration of the whole assembly facility of liquid filled system vibrationproofing mounting at a compact, and it is invented so that it can contribute to drastic reduction of facility costs, rationalization, and improvement in productivity.

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MEANS

[Means for Solving the Problem] The body set attaching part which turns said opening side upward and supports the body components which this invention is an assembly facility of liquid filled system vibrationproofing mounting which solves the above-mentioned technical problem, and have the space which carries out opening to an end side inside in the shape of abbreviation erection, In the condition of having fitted in and having attached opening of said cistern to the body components which were equipped with the cistern which has opening which can fit into a seal condition to the periphery of the body components supported to this body set attaching part at the pars basilaris ossis occipitalis, and were supported by the body set attaching part While supplying a liquid on the pars basilaris ossis occipitalis of this cistern with a liquid feeding-and-discarding means suitably, making it store and inserting and building components, such as a partition object and diaphragm, into the interior and opening of said body component In consecutiveness of the components inclusion and liquid enclosure equipment which a liquid is made to flow into the interior and are enclosed with it, and said components inclusion and liquid enclosure equipment In consecutiveness of the body collimator which carries out spinning of the opening side of these body components so that each part article which built into these body components the assembly of the aforementioned nest condition transported from this equipment may be fixed and the seal of the opening may be carried out, and a body collimator In consecutiveness of the washing dryer which washes and dries said assembly after the spinning taken out from this equipment, and said washing dryer In consecutiveness of the paint dryer which supports said assembly after desiccation pivotable, and is painted and dried while making it rotate, and this paint dryer It has at least one bracket attachment equipment which carries out attachment immobilization of the bracket for attachment to the member by the side of a car body and an engine to said assembly after paint desiccation, and is characterized by being arranged and becoming, as each of these equipments make the letter of the flat-surface abbreviation for U characters.

[0011] In order according to the assembly facility of this liquid filled system vibrationproofing mounting to also carry out neither spinning nor caulking in a liquid rather than to immerse [and] components inclusion and liquid enclosure equipment in a liquid in body components not using a big cistern, it becomes possible to arrange the whole facility to a flat-surface abbreviation U typeface satisfactory. Therefore, the tooth space of the whole facility can be miniaturized, one operator is enabled to perform activity actuation with each equipment from a way side among U typeface arrangement, and there are also few motions in that case (movement magnitude), and they end. With, assembly operation of each process, such as components inclusion on body components and liquid enclosure, washing, paint, and bracket attachment, can be efficiently performed by the activity actuation from a way side among said U typeface arrangement.

[0012] It shall come to arrange two, the bracket caulking equipment which fixes the bracket for attachment by the side of a car body according to caulking structure to the body components of said assembly as above bracket attachment equipment, and the equipment with a bracket group which fixes the bracket for attachment by the side of an engine with conclusion means, such as a bolt and a nut, to said body component. A sequential anchoring activity is done without accompanying this by the migration which has distance in the both sides of the bracket for attachment by the side of a car body, and the bracket for attachment by the side of an engine.

[0013] Where a liquid is stored on the liquid feeding-and-discarding means for making a liquid supply and discharge on said pars basilaris ossis occipitalis in the condition of having attached said cistern to body components, and the pars basilaris ossis occipitalis in said cistern, especially said components inclusion and liquid enclosure equipment The thing which comes to have the components inclusion robot which divides to said body component into a reservoir liquid, and performs nest actuation of components, such as the body and diaphragm, is desirable. It also becomes possible to be able to supply body components to a body set attaching part, to be able to do a components inclusion activity by actuation of this components inclusion and liquid enclosure equipment by this, only by supplying each part article to the components set section, and starting it, and to automate combining actuation of a consecutive body collimator. Therefore, if supply of body components and each part article is performed, it will become possible easily to perform activity actuation with other equipments, such as washing, and paint or bracket attachment, for before next supply having time allowances, having made each equipment U typeface arrangement, and having made migration length to each equipment small conjointly. That is, one operator can operate each equipment and can work.

[0014] While oil-level detection tubing which detects the oil-level height at the time of liquid supply of a up to [a pars basilaris ossis occipitalis] to the aforementioned components inclusion and the cistern of liquid enclosure equipment is formed successively When it is constituted so that it may come to prepare a valve means to suppress pulsation of an oil level in this oil-level detection tubing and said components inclusion robot's actuation may be controlled based on the detecting signal of oil-level height with this oil-level detection tubing, An inclusion activity will be done without not producing the excess and deficiency of the liquid supply to a solution layer, and producing the pause by incorrect actuation of the robot which does components inclusion and a liquid enclosure activity.

[0015] Moreover, what is prepared and becomes opening of the pars basilaris ossis occipitalis in said cistern so that the annular seal member flexibly attached to body components may be attached by the screwing means from the inferior-surface-of-tongue side to a pars basilaris ossis occipitalis and the screwing actuation of this seal member can be carried out from a top-face side is desirable.

[0016] In this case, although the seal member attached in pars-basilaris-ossis-occipitalis opening of said cistern is replaced with the seal member which corresponds according to configuration modification of body components etc. on the occasion of a stage substitute of vibrationproofing mounting for assembly, since that screwing actuation can be performed from the top-face side of a cistern even if this seal member is attached with the screwing means from a bottom subordinate side side, that exchange can be performed easily. That is, a stage substitute can be performed easily and the time amount of shutdown can be shortened.

[0017] The thing which comes to install the drawing robot which performs drawing of the assembly after migration of drawing of the assembly from this components inclusion and liquid enclosure equipment and the assembly to a body collimator and the diaphragm from a body collimator one by one between said components inclusion and liquid enclosure equipment, and a body collimator is desirable.

[0018] That is, the aforementioned drawing robot can be used for migration to drawing and the body collimator of said assembly from components inclusion and liquid enclosure equipment, and a list, drawing of the assembly from a body collimator can be performed in them in a series of continuous operation corresponding to components inclusion or a liquid enclosure activity, and the activity can be well done on them.

[0019] The thing which comes to arrange the stock base which stocks temporarily the assembly picked out from this components inclusion and liquid enclosure equipment by said drawing robot near the inside of U typeface arrangement between said body collimators and said

washing dryers is desirable. By this the assembly mechanically picked out from said body collimator one by one by the drawing robot Working hours can stock to supply to a consecutive washing dryer, with according to components inclusion and liquid enclosure equipment, and a body collimator. Even if there is a big difference in the working hours by the washing dryer and paint dryer of the consecutiveness, it is satisfactory, and the activity by each equipment can be separately started for every supply of an assembly.

[0020]

[Embodiment of the Invention] Next, it explains based on the example which shows the gestalt of operation of this invention to a drawing.

[0021] The sketch top view of the whole facility in which one example of the assembly facility which drawing 1 requires for this invention is shown, and drawing 2 are [the expansion front view of this equipment and drawing 4 of components inclusion and the expansion top view of a liquid enclosure equipment part, and drawing 3] the expansion side elevations of the important section of this equipment. Drawing 5 is the expansion front view which carried out the cross section of the cistern in which the outline of a cistern rise-and-fall means is shown.

[0022] In drawing 1, A is equipment which divides into the body components 1 of liquid filled system vibrationproofing mounting for [of vibrationproofing mounting illustrated to drawing 19] assembly, and encloses a nest liquid for the body 5 or the components of diaphragm 4 grade.

[0023] The body set attaching part 10 which turns upward the body components 1 which have the space which carries out opening of this components inclusion and the liquid enclosure equipment A to an end side inside, and supports said opening side for them in the shape of abbreviation erection. It comes to have the cistern 20 which has the opening 22 which can fit into a seal condition to the periphery of the body components 1 supported to said body set attaching part 10 at the pars basilaris ossis occipitalis 21. In the condition of having fitted in and having attached the opening 22 of said cistern 20 to the body components 1 supported by the body set attaching part 10 Supply a liquid on the pars basilaris ossis occipitalis 21 of this cistern 20 with a liquid feeding-and-discarding means suitably, and it is made to store, and while inserting and building the partition object 5 and the components of diaphragm 4 grade into the interior and opening of the body components 1, it is constituted so that a liquid may be made to flow into the interior and it may enclose with it. Preferably, it is prepared so that it may illustrate, and it may be allotted possible [rise and fall of said cistern 20] and said opening 22 can be fitted in to the opening side of the body components 1 according to a descent operation. About the detailed structure of this equipment A, it mentions later.

[0024] B is a body collimator which carries out spinning of the opening side of the body components 1 so that each part article which built the assembly a after said components inclusion and the components nest in liquid enclosure equipment A into said body component 1 may be fixed and the seal of the opening may be carried out in said components inclusion and consecutiveness of liquid enclosure equipment A.

[0025] C is a washing dryer which washes and dries said assembly a after the spinning taken out from this equipment in consecutiveness of said body collimator B, and D is a paint dryer which paints with means, such as brush coating, and is dried in consecutiveness of said washing dryer C, making it rotate in support of said assembly a after desiccation pivotable.

[0026] The bracket caulking equipment as bracket-attachment equipment which carries out attachment immobilization of the bracket 9 for attachment to the member by the side of a car body according to press fit and caulking structure to said assembly a painted in consecutiveness of said paint dryer C, and F of E are equipment with a bracket group as bracket-attachment equipment which carries out attachment immobilization of the bracket 90 for attachment to the member by the side of an engine with means, such as a nut bundle, to said assembly a.

[0027] G is a drawing robot stationed between said components inclusion, and liquid enclosure equipment A and body collimator B. It takes out from components inclusion and liquid enclosure equipment A, maintaining to a horizontal position so that it may operate in relation to said components inclusion and nest actuation of liquid enclosure equipment A, the chuck of the assembly a of a components nest condition may be carried out by the chuck section at the tip of a hand and a mounting fluid object may not be poured. It is prepared so that it may transport to the following body collimator B.

[0028] H is a stock base for stocking temporarily the assembly a after the spinning taken out from said body collimator C by the drawing robot G.

[0029] And each aforementioned equipment A-F ****s the equipment transverse plane which is on an actuation side so that the letter of the flat-surface abbreviation for U characters may be made in a predetermined tooth space like drawing 1 inside, and is arranged. Especially arrangement of this flat-surface abbreviation U typeface is considered as comparatively compact arrangement so that the space where one operator operates said each equipment A-F in the way section, and can work by the minimum motion in it among U typeface arrangement may be held, while it holds spacing of extent which does not check the activity for every equipment between said each equipment A-F. In the case of drawing, along with the way side, it is arranged also about said drawing robot G and the stock base H among arrangement of said flat-surface abbreviation U typeface.

[0030] Hereafter, it explains in more detail about the configuration of each aforementioned equipment A-F etc.

[0031] First, components inclusion and liquid enclosure equipment A are explained. 10 is a body set attaching part fixed in support of said body component 1 on a machine stool 11 at a predetermined set location. This body set attaching part 10 has the carrier branch material 13 of the body components 1 fixed to some plates 12. For example, the rubber elasticity object 3 as a vibrationproofing base is fixed with a vulcanization adhesion means to end side opening of the body components 1 2 used for vibrationproofing mounting of drawing 20, i.e., tubed body metallic ornaments. Furthermore, fixing metal 8 is fixed on this rubber elasticity object 3, opening is turned upward and the body components 1 which have a building envelope for enclosing a liquid can be supported now.

[0032] 14 has come to be able to carry out supply installation of the partition object 5 and diaphragm 4 which are the components set fixture set up on said plate 12 near said carrier branch material 13, and are the components inside vibrationproofing mounting in the orientation set up beforehand.

[0033] The body set attaching part 10 is equipped with a fixed means 15 to hold the body components 1 supported by this carrier branch material 13 in the fixed condition as shown in drawing 4 and drawing 10 R>0-12.

[0034] The cylinder equipment 16 to which this fixed means 15 operates according to the oil pressure force or the pneumatics force. In the condition that consisted of chuck equipment 17 fixed to the front end section of the output rod 16a, and the body components 1 were supplied on the carrier branch material 13 of the body set attaching part 10 If operation is started by button grabbing etc., cylinder equipment 16 operates and said chuck equipment 17 moves forward, and it is prepared so that the chuck of the body components 1 may be carried out with chuck equipment 17 and fixed maintenance can be carried out at a position.

[0035] Said chuck equipment 17 is formed possible [the pieces 18a and 18a of a pawl which make a pair in a vertical location, respectively, and closing motion of 18b and 18b], and the upside pieces 18a and 18a of a pawl are formed so that said body component 1 may be pinched from both sides. By engaging with the engagement members 19 and 19 of the typeface of abbreviation KO arranged by carrying out phase opposite at the both sides of the carrier branch material 13, the lower pieces 18b and 18b of a pawl are formed so that the variation rate to the upper part of chuck equipment 17 may be regulated.

[0036] In consideration of a stage substitute of vibrationproofing mounting for assembly, said carrier branch material 13 is constituted so that it can respond to the gestalt of two or more body components 1. For example, as shown in drawing 13, it is prepared by spacer 13a for height adjustment so that height can be adjusted.

[0037] 20 is the cistern supported possible [rise and fall] by the cistern rise-and-fall means 30 [above said body set attaching part 10].

[0038] To the body set attaching part 10, the cistern rise-and-fall means 30 drops a cistern 20, where set immobilization of the body components 1 is carried out, it is attached to the body components 1 like the after-mentioned, and it is established so that it may secede

from the body components 1 and a cistern 20 may be raised after each part article inclusion completion. That is, a motion of said fixed means 15 is interlocked with, and it operates.

[0039] The aforementioned cistern rise-and-fall means 30 is constituted using a 1 shaft actuator. For example, the guide 32 perpendicularly arranged on the front face of the support substrate 31 set up on the machine stool 11 to machine stool 11 top face in drawing. It has the **** shaft 35 in which gets into gear to the slider 33 which fitted into this guide 32 and was formed possible [rise and fall], and this slider 33, and a rotation drive is carried out by the driving means 34 of a servo motor etc. When it ****s by actuation of said driving means 34 and a shaft 35 rotates, it is prepared so that a slider 33 may move up and down (rise and fall), said cistern 20 is formed in the tie-down plate 36 fixed to this slider 33 so that a cistern 20 may go up and down with vertical movement of attachment ** and said slider 33. This cistern rise-and-fall means 30 is constituted so that the rate at the time of attaching a cistern 20 to the body components 1, a location, etc. can be controlled thinly.

[0040] It can also prepare so that you may make it go up and down the slider 33 besides the above with other means, such as cylinder equipment.

[0041] The opening 22 which can fit into a correspondence part with said body set location in a pars basilaris ossis occipitalis 21 to the up periphery of the body components 1 at a seal condition is formed so that said cistern 20 may be expanded to drawing 5 and drawing 6 and may be shown. The seal members 50, such as oil seal, are attached in the inner circumference of this opening 22, and it is prepared in it so that it may attach flexibly to the periphery section of the body components 1 and a seal condition can be held by descent of a cistern 20. And in the condition of having attached to the body components 1, the liquid of the specified quantity can be stored now on said pars basilaris ossis occipitalis 21.

[0042] Said especially seal member 50 is attached possible [desorption] by the screwing means from an inferior-surface-of-tongue side to said pars basilaris ossis occipitalis 21, and according to the class of vibrationproofing mounting for assembly, especially the gestalt of the body components 1, it is prepared so that the gestalt corresponding to it and the seal member of size can be given in exchange. In this invention, it is prepared so that screwing actuation for this exchange can be performed from a top-face, i.e., the upper part of cistern 20, side.

[0043] As shown in drawing 6 and drawing 7, specifically, the seal object 52 of a cross-section abbreviation U typeface which becomes the inner circumference of the annular periphery object 51 which consists of rigid material, such as metals, such as stainless steel and aluminum, or synthetic resin, from a rubber elasticity object comes to fix said seal member 50 with vulcanization adhesion, a press fit means, etc. A spiral rib is formed in the peripheral face of said periphery object 51, and it can screw now to opening 22 inner circumference of the cistern pars basilaris ossis occipitalis 21. In the lower limit section of said periphery object 51, it has the flange-like section 53 jutted out over the method of outside, and in the condition that this periphery object 51 screwed and attached in opening 22 inner circumference, it is formed so that the annular sealant 54 can be pinched between pars-basilaris-osis-occipitalis 21 inferior surfaces of tongue.

[0044] And in the flat surface, the groove notching 55 for screwing actuation is formed in the top face of a pars basilaris ossis occipitalis 21 to the axial center on the top face of said periphery object 51 which **** in the shape of a protrusion at the location of the direction of a cross joint, and, thereby, screwing actuation which uses the fixture for screwing actuation can be performed now from a top-face side. Thereby, exchange of the seal member 50 for a stage substitute can be performed easily. And since said seal member 50 is screwed and attached from an inferior-surface-of-tongue side to the pars basilaris ossis occipitalis 21 of a cistern 20, it can hold the sealant 54 of a screwing part as usual.

[0045] Drawing 8 and drawing 9 show the example which changed said seal member 50 according to modification of the body components 1.

[0046] In this example, the periphery object 51 of said seal member 50 has the inner flange 56 for positioning to which the upper limit section of the body components 1 which fit into said seal object 52 contacts the upper limit section inner circumference which **** in the shape of a protrusion from pars-basilaris-osis-occipitalis 21 top face, and the groove notching 55 for screwing actuation of the direction of a cross joint is formed in the top face of the periphery object 51 containing this inner flange 56 to the axial center. The body components 1 which fit into the inside can be positioned by this, as a result the attachment condition of a cistern 20 and the body components 1 can always be uniformly held now.

[0047] As notching 55 for screwing actuation formed in a top face, according to the gestalt of the fixture for screwing actuation, a configuration like a circular hole and other throats may be made, and the location and spacing, and a number can also be set as arbitration also in the seal member 50 of which said example. When consisting of groove notching of the direction of a cross joint as shown in drawing, screwing actuation can be easily carried out using the fixture of a minus configuration. Moreover, circulation of liquid also becomes good.

[0048] Moreover, it sets in the example to illustrate as a feeding-and-discarding means to supply a liquid on the pars basilaris ossis occipitalis 21 of said cistern 20, and to discharge. On the other hand, the aforementioned opening 22 of the longitudinal direction of a cistern 20 is formed in the pars basilaris ossis occipitalis 21 of one end. To the part by the side of the part except near this opening 22, for example, the other end of a longitudinal direction The crevice 24 which drops caudad and enabled it to store the liquid W of requirements is formed. The restoration float 25 which has heights part 25a which can furthermore be inserted in a crevice 24 in an inferior-surface-of-tongue side is connected with cylinder equipment 26, and it is prepared so that it may go up and down by actuation of this cylinder equipment 26. According to a rise-and-fall operation of this restoration float 25 It is constituted so that the liquid W currently stored in said crevice 24 can be discharged from supply or a pars basilaris ossis occipitalis 21 on a pars basilaris ossis occipitalis 21.

[0049] That is, by said restoration float 25 descending and inserting in a crevice 24, when the liquid W in a crevice 24 is extruded on a pars basilaris ossis occipitalis 21, and it is stored by predetermined oil-level height and said restoration float 25 goes up, the liquid W on said pars basilaris ossis occipitalis 21 carries out a ** style into a crevice 24.

[0050] At the time of descent insertion of the restoration float 25, on the pars basilaris ossis occipitalis 21 besides this restoration float 25, the volume of the aforementioned crevice 24 and the volume of the restoration float 25 are set up so that predetermined oil-level height required for air end actuation of the components mentioned later etc. can be secured.

[0051] 27 is supply tubing connected with supply means (not shown), such as a pump which supplies a liquid to said cistern 20, and is connected [pars basilaris ossis occipitalis / of said crevice 24]. Since liquids will decrease in number for every one liquid enclosure activity, the supply means of a liquid is established so that the liquid more than fixed can be stored on the pars basilaris ossis occipitalis 21 of said cistern 20 at the time of the liquid supply by the feeding-and-discarding means of said liquid, i.e., the liquid supply by descent of the restoration float 25, and a liquid may be suitably supplied in a cistern 20. Usually, the pump as a liquid supply means is formed so that it may operate based on the detection result of the oil-level height mentioned later. The exhaust port (not shown) for making the liquid in a cistern 20 discharge in the cases, such as maintenance check and washing, is also prepared in the pars basilaris ossis occipitalis of said crevice 24.

[0052] In addition, although various means, such as using the feeding-and-discarding device by other, for example, a pump, means [above] as a feeding-and-discarding means of the liquid to the pars-basilaris-osis-occipitalis 21 top of a cistern 20, can be used, a device is easy, moreover constituting as mentioned above operationally can ensure [quickly and] a feeding-and-discarding operation of a liquid, and it is especially desirable.

[0053] 40 is constituted so that the components inclusion robot's 60 actuation which is oil-level detection tubing which detects the oil-level height at the time of liquid supply of a up to [the pars basilaris ossis occipitalis 21 by the aforementioned liquid feeding-and-

discarding means], and is later mentioned through the device control section based on the detecting signal of oil-level height with this oil-level detection tubing 40 may be controlled. This oil-level detection tubing 40 is formed so that it may come to prepare the level sensor 43 which approaches this transparency tube part 42 and detects the oil-level height of an influent object and can go up and down with a cistern 20, while having the piping 41 for [it was connected / for / lower part / cistern 20 / possible / a liquid inflow] detection of ***** and forming the transparency tube part 42 in a part of this piping [at least] 41 for detection. 44 is the supporter material of said level sensor 43.

[0054] The chuck equipment 62 which 60 is a components inclusion robot which consists of a multiaxial articulated robot etc., and has the pieces 63 and 64 of a pawl of the pair which can be freely opened and closed to the point of the hand 61 is formed. This components inclusion robot 60 is formed so that it is controlled based on a detecting signal with said oil-level detection tubing 40, and it starts actuation with the signal from the device control section which received that detecting signal when it detected that the oil-level height at the time of liquid supply of a up to [the pars basilaris ossis occipitalis 21 of said cistern 20] reached fixed level, and actuation may be suspended, when said oil-level height is below fixed level.

[0055] The location of the body components 1 which this components inclusion robot 60 was set on the body set attaching part 10, and were fixed, Physical relationship, such as a location of each part article set to the components set fixture 14, and height of the cistern 20 attached to the body components 1, oil-level height on the pars basilaris ossis occipitalis 21 in this cistern 20, It responds to said oil-level height further. descent of a cistern 20 — attachment actuation with the body components 1 — The chuck of the partition object 5 set to the above-mentioned components set fixture 14 or the components of diaphragm 4 grade is carried out with the sequential aforementioned chuck equipment 62. While making it move above said cistern 20 attached to the body components 1, it is made to descend in a correspondence location with the body components 1. It inclines in predetermined air end actuation, for example, the components which carried out the chuck, and teaching is set up and carried out so that air end actuation and the nest actuation mentioned later of being immersed into a liquid with a posture may be performed. It is prepared so that the actuation may furthermore be amended if needed.

[0056] In addition, this components inclusion and liquid enclosure equipment A are intermediary **** [as] which will be in a standby condition in preparation for supply of the following body components 1, and will operate a start button etc. for every supply of the body components 1 if a series of components inclusion actuation about one product is completed. 70 is a control unit equipped with the device control section and a start button, an earth switch, etc. of components inclusion and liquid enclosure equipment A.

[0057] Moreover, body collimator B is equipped with the attaching part 101 which makes the opening side the upper part sense, and supports the assembly a of a components inclusion condition which is picked out from the above-mentioned components inclusion and liquid enclosure equipment A by the drawing robot G, and is transported, and the drawing-die section 103 which goes up and down with cylinder equipment 102 in the upper part as shown in drawing 14. The drawing-die section 103 is constituted so that spinning which makes the diameter of the opening side of the tubed body metallic ornaments 2 which constitute the body components 1 in said assembly a reduce can be performed with the descent operation. Since the same thing as the collimator better known [the mold structure of this drawing-die section 103] than before or existing can be used, that detailed explanation is omitted.

[0058] It is desirable for the drawing robot G formed between said components inclusion, and liquid enclosure equipment A and body collimator B to do the chuck of the assembly a by the chuck section 107 which it has at the tip of a hand 106, and to pick it out from components inclusion and liquid enclosure equipment A, to be prepared so that it may transport to the following body collimator B, but to prepare so that the chuck of the assembly a after spinning may be carried out and it may be further taken out from body collimator B. In this case, the taken-out assembly a is formed so that it may drop into the stock base H prepared along with the inside of U typeface arrangement.

[0059] Moreover, the washing dryer C of consecutiveness of said body collimator B The rotation cradle 111 of a basket form which holds the assembly a which is picked out one piece at a time from the stock base H, and is supplied so that it may sketch in drawing 15. The foreign matters and dirt which came to have the injection nozzle 112 which injects the warm water around 80 degrees C to the assembly a on this rotation cradle 111, and have adhered to the periphery of Assembly a by this warm water injection, such as some mounting fluid objects and oil, are removed. The ventilation means (not shown) for carrying out desiccation after washing early can also be established if needed. Moreover, it can also prepare so that it may support in the shape of abbreviation erection by said rotation cradle 111. An operator does operation actuation of it by actuation of the start button prepared in the control unit 110, when said assembly a supplies this washing dryer C. Operation time is suitably set up according to the effectiveness of washing etc.

[0060] Said stock base H consists of a chute which inclined toward the washing dryer C side from said body collimator B side along with the inside of U typeface arrangement, and can stock now two or more assemblies a in the lower part. An operator supplies one stocked assembly a at a time to the sequential washing dryer C. As a stock base H, you may be the thing of a mere cube type.

[0061] The paint dryer D is equipped with the rotation susceptor 121 which supports Assembly a pivotable focusing on the axial center in the state of erection, and can perform predetermined paint now by the brush coating by the operator to the assembly A which carries out support **** rotation by this rotation susceptor 121 so that it may sketch in drawing 16. 122 is a ventilation means for desiccation after paint, and covering whose 123 can ventilate now from diffuser 122a and prevents diffusion of the droplet at the time of paint, and 124 are saucers.

[0062] In addition, as a paint means, spray painting is also possible and the nozzle member 125 for it can also be put side by side. However, since the device for spray painting, its controlling mechanism, etc. become complicated and become cost quantity in that case, as for this paint, it is desirable to consider as the brush coating by the operator as mentioned above. 120 is a control unit which operates [dryer / D / the / paint / want / to make it].

[0063] The bracket caulking equipment E as 1st bracket attachment equipment is equipped with the type section 133 for caulking which goes up and down said assembly a with cylinder equipment 132 at an erection condition in support, the supporter 131 which places fixing metal 8 upside down preferably, and is supported in the erection condition, and its upper part so that it may sketch in drawing 17. The type section 133 for caulking is formed so that the bracket 9 for attachment by the side of a car body may be pressed fit to the assembly a supported to said supporter 131 and the caulking immobilization of the edge can be carried out according to the descent operation.

[0064] That is, said bracket 9 for attachment is constituted so that caulking immobilization of the edge may be carried out, while it comes to attach bracket piece 9b which has a hole for bolt conclusion to one and said cylinder part 9a is pressed fit in the body metallic ornaments 2 by descent operation of said type section 133 for caulking at cylinder part 9a pressed fit to the body metallic ornaments 2 in Assembly a as shown in drawing 19. Since the same thing as equipment better known [the structure of this type section 133 for caulking] than before or existing can be used, that detailed explanation is omitted. 135 is a control unit equipped with a start button etc.

[0065] Moreover, the bracket inclusion equipment F as 2nd bracket attachment equipment turned the fixing metal 8 in said assembly a up, and is equipped with the supporter 141 supported in the erection condition, and the bolt runner equipment 143 which goes up and down with cylinder equipment 142 in the upper part so that it may sketch in drawing 18. Bolt runner equipment 143 has the runner body 144 which holds the bolt 91 for attachment in the lower limit section, and rotates in it. In the condition of having set the bracket 90 for attachment by the side of an engine to said fixing metal 8 of the assembly a supported to said supporter 141 By descending, while the runner body 144 rotates, where the bolt 91 for attachment is held, it is prepared so that said bolt 91 may be bound tight by the predetermined bolting force from said bracket 90. 145 is a control unit equipped with a start button etc.

[0066] In addition, the bolt for attachment is protruded on fixing metal 8, and a bracket 90 can also be fixed by the nut bundle to this bolt

for attachment. In this case, said bolt runner equipment 143 is constituted as nut-runner equipment.

[0067] In addition, also making it hold manually in the lower limit section of the runner body 144 can also make said bolt 91 for attachment, nut, etc. hold with an automatic supply means. Moreover, in case an operator does supply of the assembly a to said supporter 141, and the set activity of a bracket 90, temporary tightening of said bolt 91 can also be carried out to coincidence. Since the same thing as equipment better known [the bolting device of bolt runner equipment 143 or nut-runner equipment etc.] than before or existing can be used, the detailed explanation is omitted.

[0068] The bracket caulking equipment E as above bracket attachment equipment and the equipment F with a bracket group may omit either depending on the gestalt of liquid seal close type vibrationproofing mounting.

[0069] The assembly facility by the above-mentioned configuration explains the case where liquid filled system vibrationproofing mounting of drawing 19 is assembled.

[0070] First, in subassembly and liquid enclosure equipment A, the body components 1 which have space inside and carry out opening to an end side are changed into the abbreviation erection condition of having turned said opening up, and are supplied and set on the carrier branch material 13 of the body set attaching part 10. Moreover, the components of the partition object 5 and diaphragm 4 grade are laid in the orientation on the components set fixture 14.

[0071] In this way, if operation of equipment is started by start button actuation etc., in the body set attaching part 10, the cylinder equipment 16 of the fixed means 15 will operate, the chuck equipment 17 at a tip will move forward, the chuck of said body component 1 will be carried out with chuck equipment 17, and fixed maintenance will be carried out at said set location.

[0072] It is attached so that a seal condition may be held through the seal member 50 which fitted into the periphery of said body components 1 which the opening 22 which the cistern rise-and-fall means 30 will operate next if the body components 1 are fixed, a cistern 20 descends in a slider 33 like the chain line of drawing 5 by the drive of a driving means 34, and it has at the pars basilaris ossis occipitalis 21 is aligned by this, and are held, and was prepared in this opening 22. When it has the inner flange 56 in the upper limit section inner circumference which **** from pars-basilaris-ossis-occipitalis 21 top face like drawing 8 at this time, it is positioned because the upper limit section of the body components 1 which fitted into said seal object 52 contacts, and the attachment condition by fitting always becomes fixed. A touch area with the liquid of the body components 1 also decreases.

[0073] After the liquid W of the specified quantity is stored in this cistern 20 by the crevice 24 established in a part of that pars basilaris ossis occipitalis and the aforementioned attachment is completed to it, the restoration float 25 descends by actuation of cylinder equipment 26, and when heights part 25a inserts in said crevice 24 like the chain line of drawing 5, the liquid W in a crevice 24 is extruded and supplied on the pars basilaris ossis occipitalis 21 into which said body component 1 has fitted. This flows into the building envelope 9 of the body components 1 from the opening edge of the body components 1 which the liquid is ****(ing) from the pars basilaris ossis occipitalis 21, and it is stored by predetermined oil-level height required for a components nest.

[0074] Moreover, when the oil level of said liquid W reaches fixed level at the time of supply of the liquid to said pars-basilaris-ossis-occipitalis 21 top, Operate the components inclusion robot 60 and the chuck of the components of the partition object 5 by which the supply set is carried out, and diaphragm 4 grade is carried out to the predetermined location on the components set fixture 14 with the chuck equipment 62 at sequential hand 61 tip. After move onto said cistern 20, descending, holding into a predetermined inclination posture, inclining to the liquid W stored by said cistern 20, carrying out being immersed with a posture etc. and performing the air end, it returns horizontally in Liquid W, and inserts and incorporates from the opening edge of said body component 1. Under the present circumstances, if needed, using the object for partition object wearing, and the cylinder 65 for diaphragm wearing, as it pushes into a predetermined location, it can include in it. Moreover, said components inclusion robot's 60 hand 61 returns to the original location, and a next nest operation is equipped with it.

[0075] If the nest of each part article is completed as mentioned above, the restoration float 25 will go up and Liquid W will be discharged by actuation of cylinder equipment 26 from ***** and a pars basilaris ossis occipitalis 21 in connection with this in a crevice 24. Then, said cistern 20 is raised and it is made to break away from the body components 1 by actuation of the cistern rise-and-fall means 30. Moreover, the chuck operation by the chuck equipment 17 of the fixed means 15 is canceled, and chuck equipment 17 is returned to the original location with cylinder equipment 16.

[0076] The drawing robot G will operate, a chuck is carried out by the chuck section 107 which has the assembly a of the components inclusion condition currently supported by said body set attaching part 1 at the tip of a hand 106, if a series of aforementioned actuation is completed, it will take out in the condition of having held to the horizontal position, and will transport to the following body collimator B so that a liquid may not be made to flow out, and an opening side is made into the upper part sense, and an attaching part 101 is made to support it. In this way, the drawing robot's G hand 106 secedes from Assembly a. The seal of the edge is carried out so that spinning which makes the diameter of the opening side of the tubed body metallic ornaments 2 in said assembly a reduce when the drawing-die section 103 descends may be performed and the liquid spill of the components, such as an incorporated partition object and diaphragm, may not be fixed and carried out by actuation of cylinder equipment 102 in this condition. If this spinning is completed, while said drawing-die section 103 will go up, it operates again, and said drawing robot G does the chuck of the assembly a on said attaching part 101, takes it out, and drops into the stock base H for supply to the below-mentioned washing dryer C. The drawing robot G returns to the original position in readiness.

[0077] The assembly [finishing / spinning] a taken out by the stock base H is stocked suitably here, and an operator supplies and washes it at a time to the washing dryer C suitably at one piece according to the progress condition of each consecutive equipment etc. That is, Assembly a is supplied on the rotation cradle 111 of a basket form, operation is started by actuation of a start button etc., and fixed time amount warm water is injected and washed, rotating said cradle. It sets during the 1 scheduled time after washing, and it dries, ventilating as occasion demands. The dry assembly a is picked out from this washing dryer C, and is stocked in the supply standby section (not shown) for supplying the following paint dryer D as it is, or supplying the paint dryer D.

[0078] An operator supplies at a time one assembly a which was washed as mentioned above and dried to the rotation susceptor 121, and makes an erection condition support it in the paint dryer D. In this way, Assembly a is rotated with the rotation susceptor 121 by start button actuation, and predetermined paint is carried out to the predetermined part, for example, fixing metal etc. This paint is performed by carrying out brush coating to the assembly a which an operator rotates. If paint is completed, it will be made to dry by the ventilation from the diffuser 122 for ventilation. moreover, if needed, it takes out from said rotation susceptor 121, and places on the base — it can also be made to dry Depending on the progress condition of an activity with consecutive equipment, it may stock as it is.

[0079] If paint and desiccation of this assembly a are completed, said assembly a will be supplied to the bracket caulking equipment E for the next bracket attachment. With this bracket caulking equipment E, while supporting said assembly a in the erection condition with a supporter 131, cylinder part 9a of the bracket 9 for attachment is set to the condition of having fitted in partially to the body metallic ornaments 2, to this assembly a. In this condition, with cylinder equipment 132, cylinder part 9a of said bracket 9 for attachment is pressed fit for the type section 133 for caulking to the body metallic ornaments 2 according to a descent operation, and caulking immobilization of that edge is carried out further. And said assembly is taken out after a rise of the mold 133 for caulking.

[0080] Then, in attaching the bracket 90 for attachment by the side of an engine further, the aforementioned assembly a is supplied to the equipment F with a bracket group as 2nd bracket attachment equipment, and to the supporter 141 with which this equipment F with a group is equipped, the fixing metal 8 in said assembly a is turned up, and it supports at an erection condition. And while fitting the mounting

hole section into fixing metal 8 and setting the bracket 90 for attachment to it, the bolt 91 for attachment is set to the runner body 144 of bolt runner equipment 143, or temporary tightening is carried out to screwhole 8a for attachment. In this condition, bolt runner equipment 143 is dropped by actuation of cylinder equipment 142, said bolting nut 91 is bound tight with the rotating runner body 144, and said bracket 90 is fixed. And said assemblies a are taken out and collected after a rise of bolt runner equipment 143.

[0081] Thereby, as shown in drawing 19, it can divide into the interior of the body components 1, a nest and a liquid can be enclosed for the body 5 or the components of diaphragm 4 grade, predetermined paint can be performed, and liquid seal close type vibrationproofing mounting besides attachment can be assembled for the bracket 9 for attachment by the side of a car body, and the bracket 90 by the side of an engine at the periphery section and the edge of the body components 1.

[0082] By having arranged the whole facility to the flat-surface abbreviation U typeface especially, the tooth space of the whole facility can be miniaturized, one operator is enabled to perform activity actuation with each equipment from a way side among U typeface arrangement, and there are also few motions in that case (movement magnitude), and they end. And the process of spinning can be continuation-ized in components inclusion on body components and liquid enclosure, and a list, and the activity actuation by one operator from a way side can perform each equipment efficiently among said U typeface arrangement by having made it operate each process, such as subsequent washing, paint, and bracket attachment, separately.

[Translation done.]

* NOTICES *

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.*** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

- [Drawing 1] It is the sketch top view of the whole facility in which one example of the assembly facility concerning this invention is shown.
- [Drawing 2] It is the expansion top view of components inclusion and a liquid enclosure equipment part.
- [Drawing 3] It is the front view of equipment same as the above.
- [Drawing 4] It is the side elevation of the important section of this equipment.
- [Drawing 5] Drawing 5 is the expansion front view which carried out the cross section of the cistern in which the outline of a cistern rise-and-fall means is shown.
- [Drawing 6] It is the expanded sectional view of the attachment part of the seal member of a cistern same as the above.
- [Drawing 7] It is the perspective view of this seal member.
- [Drawing 8] It is the expanded sectional view of the attachment part of the seal member of other examples.
- [Drawing 9] It is the perspective view which chipped off in a part of this seal member.
- [Drawing 10] It is the expansion top view of a body set attaching part.
- [Drawing 11] It is a front view in the condition of having fixed body components same as the above.
- [Drawing 12] It is the sectional view showing the relation of a body set attaching part and a solution layer.
- [Drawing 13] It is the sectional view showing the relation of the body set attaching part of other examples, and a solution layer.
- [Drawing 14] It is the sketch front view of a body collimator part.
- [Drawing 15] It is the sketch front view of a washing dryer part.
- [Drawing 16] It is the sketch side elevation of a paint dryer part.
- [Drawing 17] It is the sketch front view of a bracket caulking equipment part.
- [Drawing 18] It is the sketch front view of a bracket inclusion equipment part.
- [Drawing 19] It is the sectional view which illustrates liquid filled system vibrationproofing mounting for an assembly.

[Description of Notations]

- A Components inclusion and liquid enclosure equipment
- B Body collimator
- C Washing dryer
- D Paint dryer
- E Bracket caulking equipment
- F Equipment with a bracket group
- G Drawing robot
- H Stock base
- W Liquid
- Assembly
- 1 Body Components
- 2 Tubed Body Metallic Ornaments
- 3 Rubber Elasticity Object
- 4 Diaphragm
- 5 Partition Object
- 6a, 6b Liquid room
- 7 Orifice
- 8 Fixing Metal
- 8a The screwhole for attachment
- 9 Bracket for Attachment
- 9a Cylinder part
- 9b Bracket piece
- 10 Body Set Attaching Part
- 11 Machine Stool
- 13 Carrier Branch Material
- 14 Components Set Fixture
- 15 Fixed Means
- 16 Cylinder Equipment
- 17 Chuck Equipment
- 20 Cistern
- 21 Pars Basilaris Osis Occipitalis
- 22 Opening
- 24 Crevice
- 25 Restoration Float
- 26 Cylinder Equipment
- 30 Cistern Rise-and-Fall Means
- 33 Slider
- 34 Driving Means
- 35 Screw-Thread Shaft
- 40 Oil-Level Detection Tubing
- 41 Piping for Detection

42 transparence tube part
43 Level Sensor
45 Valve Means
50 Seal Member
51-Periphery Object
52 Seal Object
53 Flange-like Section
54 Sealant
55 Notching
56 Inner Flange
60 Components Inclusion Robot
61 Hand
62 Chuck Equipment
70 Control Unit
90 Bracket for Attachment
91 Bolt for Attachment
101 Attaching Part
102 Cylinder Equipment
103 Drawing-Die Section
106 Hand
107 Chuck Section
110 Control Unit
111 Rotation Cradle
112 Injection Nozzle
121 Rotation Susceptor
122 Diffuser for Ventilation
124 Nozzle Member
131 Supporter
132 Cylinder Equipment
133 Type Section for Caulkings
135 Control Unit
141 Supporter
142 Cylinder Equipment
143 Nut-Runner Equipment
144 Runner Body
145 Control Unit

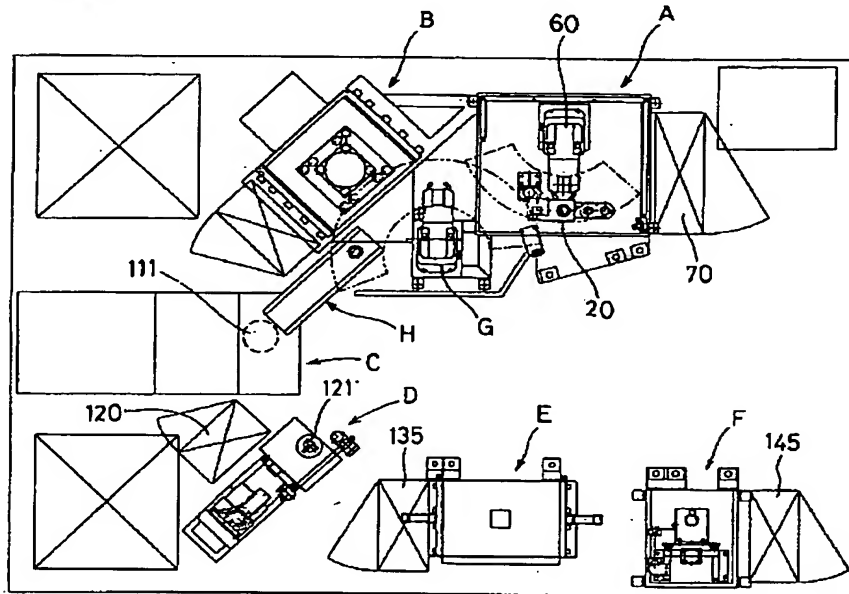
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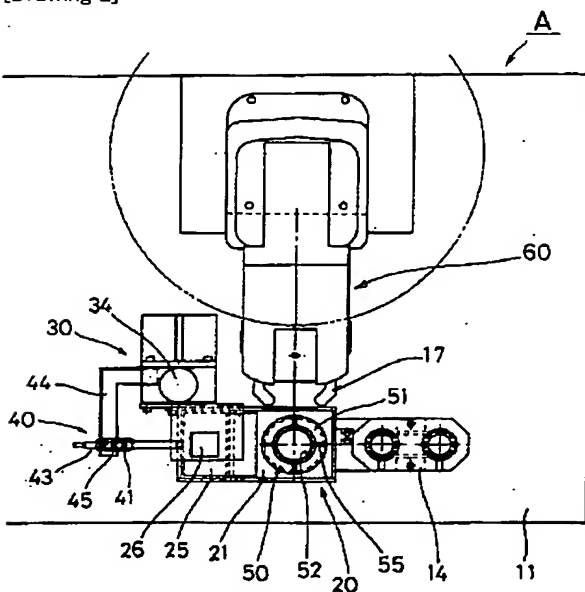
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DRAWINGS

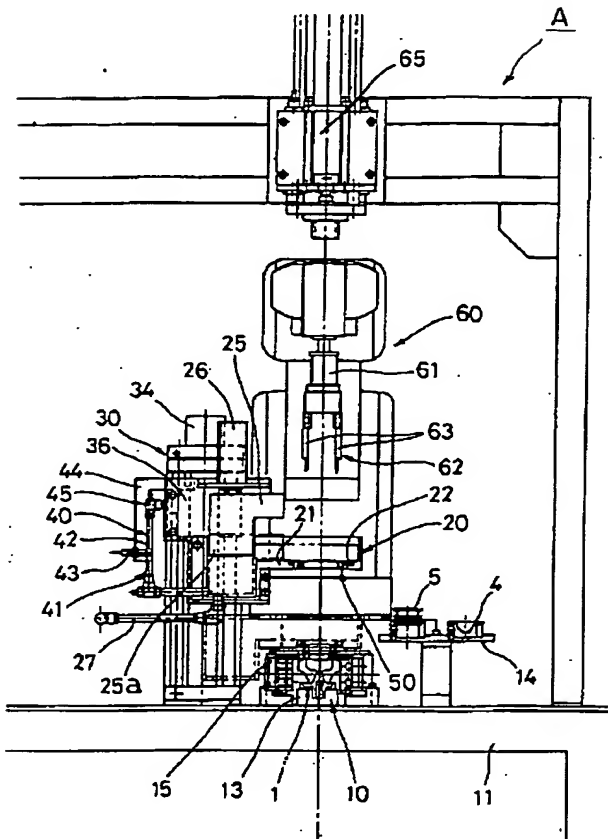
[Drawing 1]



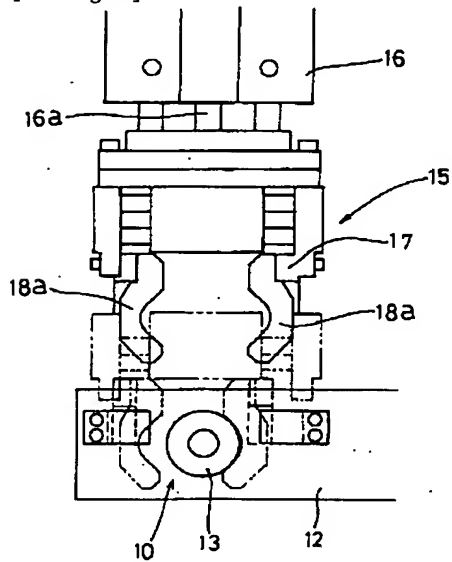
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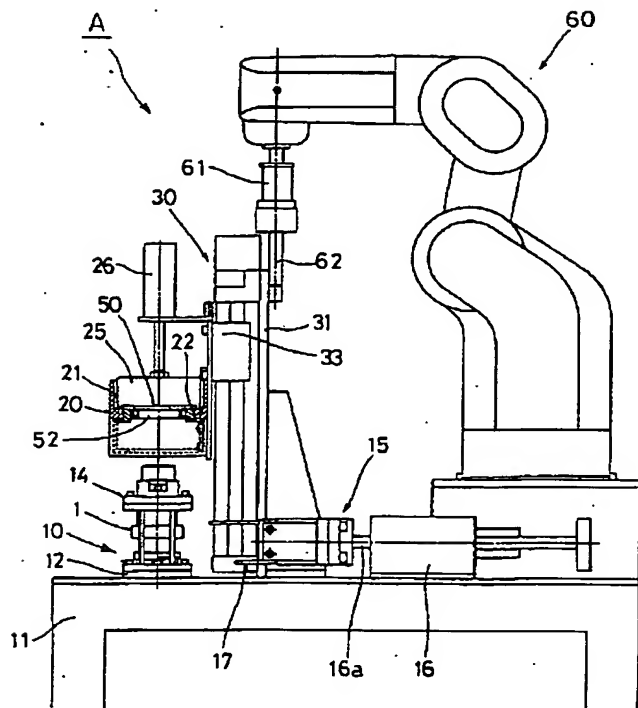
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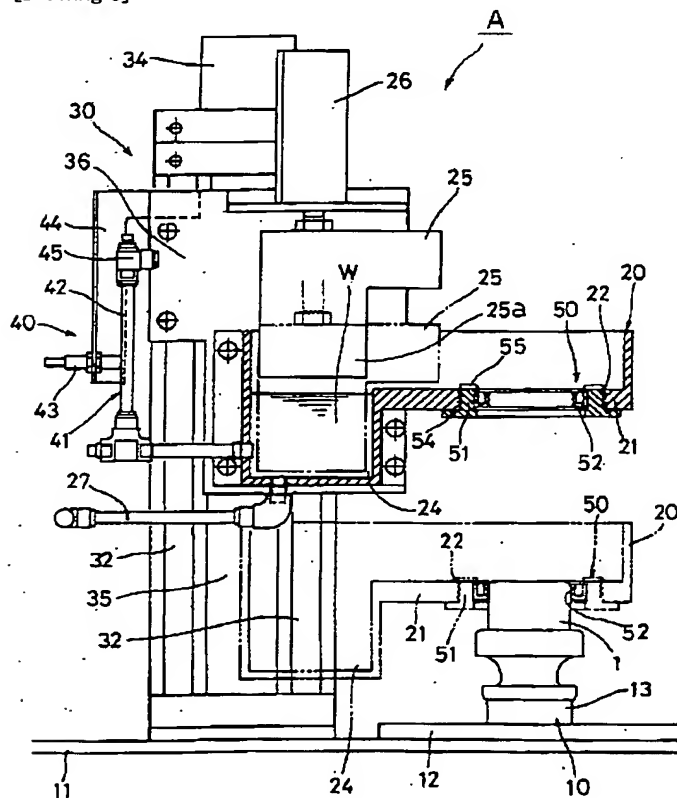
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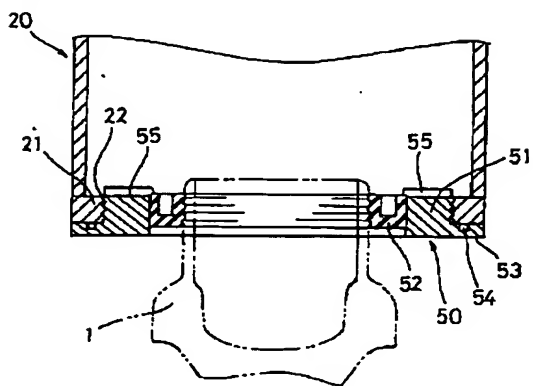
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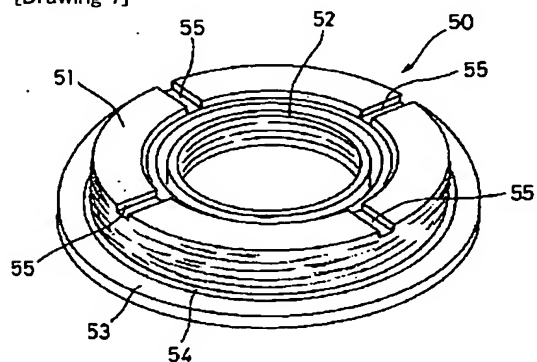
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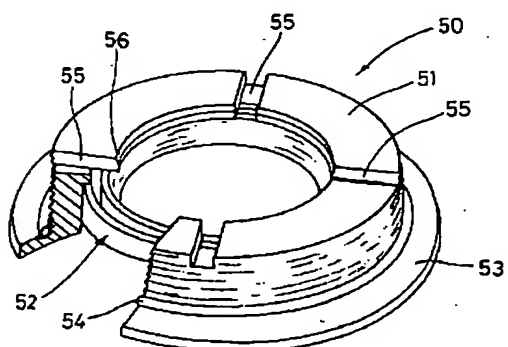
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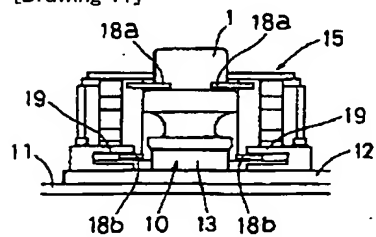
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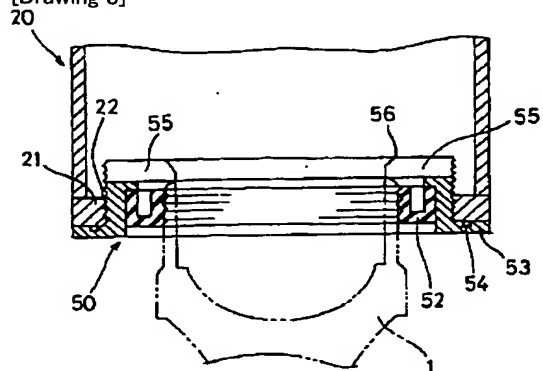
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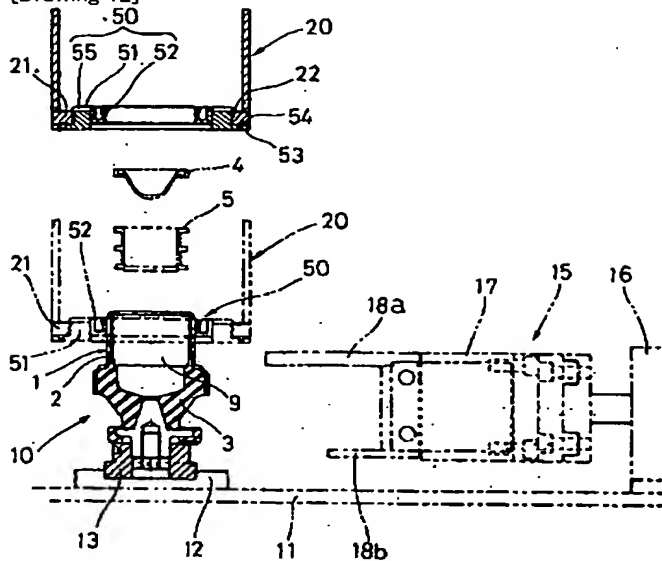
[Drawing 11]



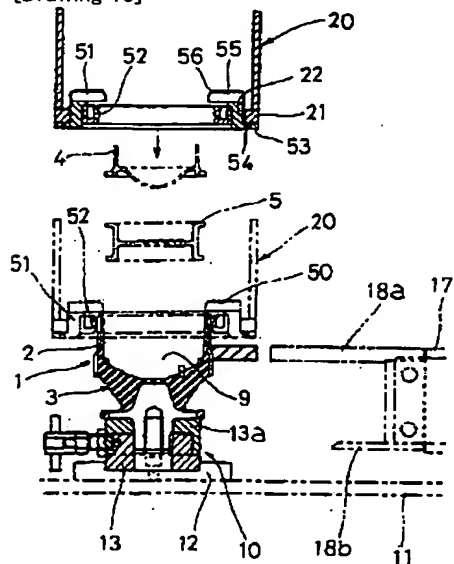
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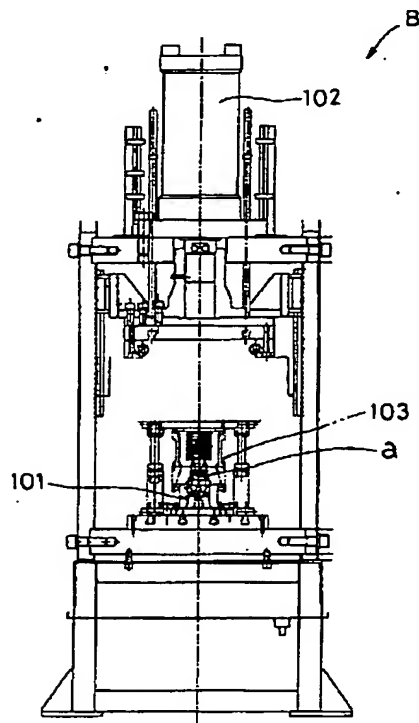
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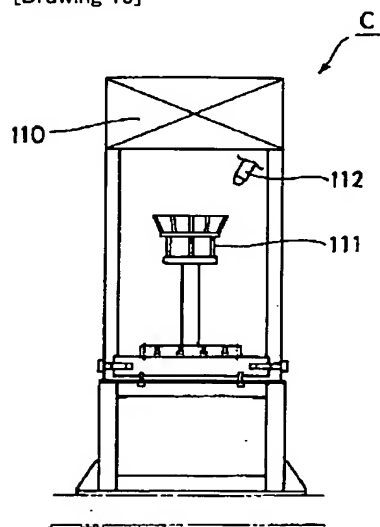
[Drawing 13]



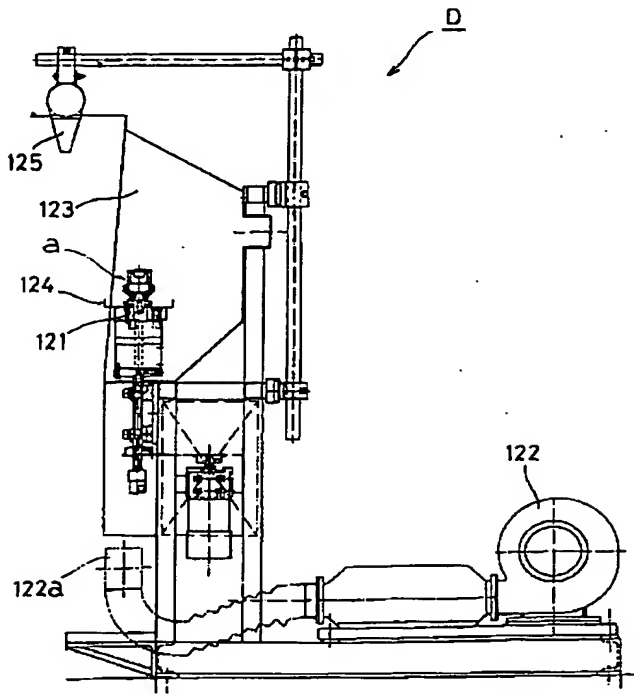
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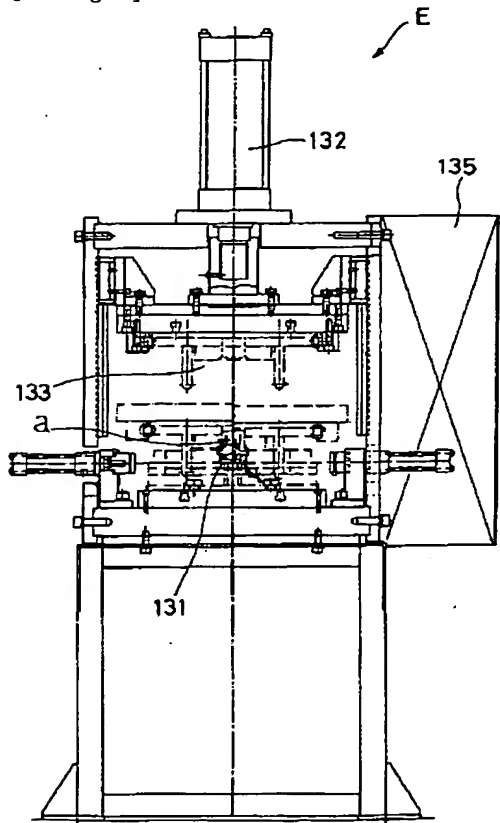
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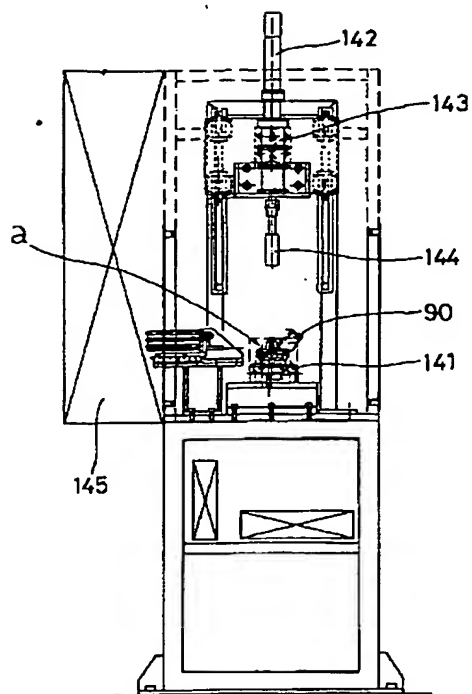
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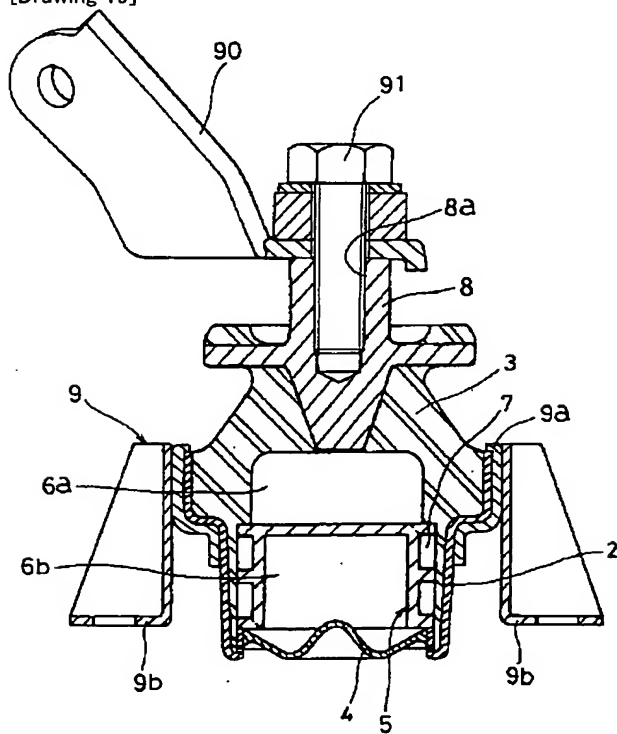
[Drawing 17]



[Drawing 18]



[Drawing 19]



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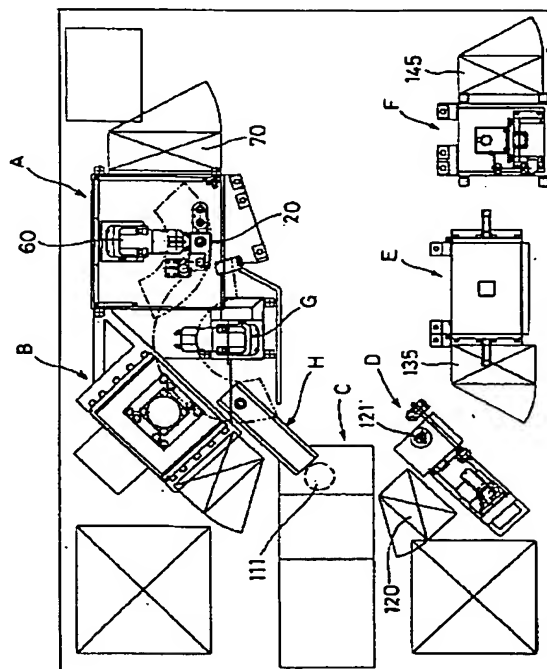
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(54) 【発明の名称】 液体封入式防振マウントの組立設備

(57) 【要約】

【課題】 液体封入式防振マウントの組立設備の設置スペースをコンパクト化し、設備費用の大幅な削減、合理化、生産性の向上を図る。

【解決手段】、本体部品の開口側に液槽 20 を組付けた状態で、液体を供給して本体部品の内部に各部品を組み込み液体を封入する部品組込及び液体封入装置 A と、部品組込み状態の組立体の開口側を絞り加工する本体絞り装置 B と、組立体を洗浄し乾燥させる洗浄乾燥装置 C と、組立体を塗装し乾燥させる塗装乾燥装置 D と、組立体に対して取付用ブラケットを取付固定するブラケット取付装置 E、F とを、平面略 U 字状をなすように配置する。



【特許請求の範囲】

【請求項1】一端側に開口する空間を内部に有する本体部品を、前記開口側を上向きにして略直立状に支持する本体セット保持部と、この本体セット保持部に支持した本体部品の外周に対してシール状態に嵌合し得る開口部を底部に有する液槽とを備え、本体セット保持部に支持された本体部品に対し前記液槽の開口部を嵌合して組付けた状態において、該液槽の底部上に液体を供給し貯留させて、仕切り体やダイヤフラム等の部品を前記本体部品の内部や開口部に嵌入して組込むとともに、内部に液体を流入させ封入する部品組込及び液体封入装置と、前記部品組込及び液体封入装置の後続において、該装置から移送されてくる前記の組込み状態の組立体を、該本体部品に組込んだ各部品を固定し開口をシールするように該本体部品の開口側を絞り加工する本体絞り装置と、本体絞り装置の後続において、該装置から取出された絞り加工後の前記組立体を洗浄して乾燥させる洗浄乾燥装置と、前記洗浄乾燥装置の後続において、乾燥後の前記組立体を回転可能に支持し、回転させながら塗装し乾燥させる塗装乾燥装置と、この塗装乾燥装置の後続において、塗装乾燥後の前記組立体に対して車体側やエンジン側の部材に対する取付用ブラケットを取付固定する少なくとも一つのブラケット取付装置とを備え、これらの各装置が、平面略U字状をなすように配置されてなることを特徴とする液体封入式防振マウントの組立設備。

【請求項2】前記ブラケット取付装置として、車体側への取付用ブラケットを前記組立体の本体部品に対してかしめ構造により固定するブラケットかしめ装置と、エンジン側への取付用ブラケットを前記本体部品に対してボルト、ナット等の締結手段により固定するブラケット組付装置との二つが配置されてなる請求項1に記載の液体封入式防振マウントの組立設備。

【請求項3】前記部品組込及び液体封入装置は、前記液槽を本体部品に組付けた状態において前記底部上に液体を供給しかつ排出させるための液体給排手段と、前記液槽内の底部上に液体を貯留した状態で、液体中の前記本体部品に対して仕切り体やダイヤフラム等の部品の組込み動作を行う部品組込ロボットとを備えてなる請求項1または2に記載の液体封入式防振マウントの組立設備。

【請求項4】前記液槽には、底部上への液体供給時の液面高さを検出する液面検出管が連設されるとともに、該液面検出管に液面の脈動を抑える弁手段が設けられてなり、該液面検出管による液面高さの検出信号に基づいて前記部品組込ロボットの作動が制御されるように構成されてなる請求項3に記載の液体封入式防振マウントの組立設備。

【請求項5】前記液槽底部の開口部には、本体部品に対

して弾力的に嵌着する環状のシール部材が底部に対する下面側からの螺合手段により取着され、該シール部材が上面側から螺合操作できるように設けられてなる請求項1～4のいずれか1項に記載の液体封入式防振マウントの組立設備。

【請求項6】前記部品組込及び液体封入装置と本体絞り装置との間に、該部品組込及び液体封入装置からの組立体の取出し、本体絞り装置への組立体の移送、及び本体絞り装置からの絞り後の組立体の取出しを順次行う取出しロボットが設置されてなる請求項1～5のいずれか1項に記載の液体封入式防振マウントの組立設備。

【請求項7】前記本体絞り装置と前記洗浄乾燥装置との間のU字形配置の内側近傍に、該部品組込及び液体封入装置から前記取出しロボットにより取出された組立体を一時的にストックしておくストック台が配置されてなる請求項6に記載の液体封入式防振マウントの組立設備。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、主として自動車用のエンジン等を防振的に支承するのに用いられる液体封入式防振マウントの組立設備に関するものである。

【0002】

【従来の技術と発明が解決しようとする課題】自動車のエンジン等をその振動を車体に伝達させないように支承するマウントとして、例えば図19に例示するように、筒状の本体金具2、防振基体としてのゴム弾性体3およびダイヤフラム4が室壁の一部をなしかつ液体を封入した本体内部を、仕切り体5により例えば上下の液室6a、6bに仕切り構成し、両液室6a、6bを仕切り体5に有するオリフィス7により連通させて、オリフィス7による液体流動抵抗やゴム弾性体3の防振効果により、振動を減衰し吸収するようにした液体封入式防振マウントが知られている。この防振マウントは、車体側への取付用ブラケット9やエンジン側への取付用ブラケット90が取付られて使用される。

【0003】このような液体を封入した防振マウントは、筒状の本体金具2の一端側開口部にゴム弾性体3を加硫接着するとともに、該ゴム弾性体3に取付用ネジ孔8aを有する取付金具8を加硫接着して、内部に液体を封入するための空間を有する本体部品1を形成しておき、この本体部品1に対し仕切り体5やダイヤフラム4等の部品を組込むとともに、内部に液体を封入する。そして、組込んだ部品を固定するために本体部品の開口側を絞り加工するとともに端部をかしめ固定し、さらに付着している液体や汚れを落とすための洗浄を行い、その乾燥後に必要な塗装を行う。この塗装が乾燥した後、車体側への取付用ブラケット9やエンジン側への取付用ブラケット90が、かしめ構造及び／又は圧入構造により、あるいは前記取付用ネジ孔8aに対し螺合する取付用ボルト91等の締結手段により組付け固定される。

【0004】従来、前記の防振マウントの組立ての一連の工程において、部品組込及び液体封入作業は、かなり大きい液槽を使用し、この液槽中に、本体部品を液中に浸漬所定の姿勢に保持する工程、仕切り体やダイヤフラム等の部品の本体部品への組込み工程、組込んだ部品を固定するかしめ工程、組込んだマウントを液槽から取り出す工程等の複数の工程を設定し、本体部品を液中で各工程に移送させながら、液中で部品組込み作業を行っていた。

【0005】そのため、前記液槽がかなり長くて、これに続く、本体絞り工程や洗浄及び塗装工程等を列に並べると組立設備全体はかなり長大になり、また仮に各工程の装置をL字形に配置した場合も、全体として大きな設置スペースを必要とするものであった。

【0006】さらに、各工程の装置を全て連関して動作するように自動化したものにすると、人的な労働力は削減できるが、全体の設備費用はかなり膨大になる上、工程作業毎に所要時間が異なり、例えば洗浄や塗装の工程では乾燥も必要になることから時間がかかり、かえって組立設備全体としての稼働率が低下し、生産性を高めることができないという問題もあった。

【0007】本発明者らは、前記の本体部品に対する部品組込及び液体封入作業の工程及び装置をコンパクトにするために、本体部品を液体中に浸漬して行うのではなく、本体部品の開口側に対して嵌合する開口部を底部に有する液槽を用いて、該液槽を部品組込の作業毎に、本体部品の開口側に嵌合して組み付けるとともに液体を供給して、部品組込及び液体封入作業を行う方法、装置を提案した（特開平11-230235号）。

【0008】この部品組込及び液体封入装置を使用するものであっても、その後の洗浄や塗装及びブラケット取付等の組立設備全体の配置等が従来と同様のものでは、組立設備全体としてのスペースや稼働率等の点では充分でなく、さらなる改善が求められている。

【0009】本発明は、上記に鑑みてなしたものであり、液体封入式防振マウントの組立設備の全体をコンパクトに配置構成でき、設備費用の大幅な削減、合理化、生産性の向上に寄与できるように発明したものである。

【0010】

【課題を解決するための手段】本発明は、上記の課題を解決する液体封入式防振マウントの組立設備であり、一端側に開口する空間を内部に有する本体部品を、前記開口側を上向きにして略直立状に支持する本体セット保持部と、この本体セット保持部に支持した本体部品の外周に対してシール状態に嵌合し得る開口部を底部に有する液槽とを備え、本体セット保持部に支持された本体部品に対し前記液槽の開口部を嵌合して組付けた状態において、適宜液体給排手段により該液槽の底部上に液体を供給し貯留させて、仕切り体やダイヤフラム等の部品を前記本体部品の内部や開口部に嵌入して組込むとともに、

内部に液体を流入させ封入する部品組込及び液体封入装置と、前記部品組込及び液体封入装置の後続において、該装置から移送されてくる前記の組込み状態の組立体を、該本体部品に組込んだ各部品を固定し開口をシールするように該本体部品の開口側を絞り加工する本体絞り装置と、本体絞り装置の後続において、該装置から取出された絞り加工後の前記組立体を洗浄して乾燥させる洗浄乾燥装置と、前記洗浄乾燥装置の後続において、乾燥後の前記組立体を回転可能に支持し、回転させながら塗装し乾燥させる塗装乾燥装置と、この塗装乾燥装置の後続において、塗装乾燥後の前記組立体に対して車体側やエンジン側の部材に対する取付用ブラケットを取付固定する少なくとも一つのブラケット取付装置とを備え、これらの各装置が、平面略U字状をなすように配置されてなることを特徴とする。

【0011】この液体封入式防振マウントの組立設備によれば、部品組込及び液体封入装置が大きな液槽を用いておらず、本体部品を液体に浸漬するのではなく、また液体中で絞り加工やかしめ加工をするのでもないため、設備全体を平面略U字形に配置することが問題なく可能になる。そのため、設備全体のスペースをコンパクト化でき、各装置での作業操作をU字形配置の内方側から一人の作業者が行うことが可能となり、またその場合の動き（移動量）も少なく済む。以て、本体部品への部品組込及び液体封入、洗浄、塗装、ブラケット取付等の各工程の組立作業を、前記U字形配置の内方側からの作業操作で効率よく行うことができる。

【0012】前記のブラケット取付装置としては、車体側への取付用ブラケットを、前記組立体の本体部品に対してかしめ構造により固定するブラケットかしめ装置と、エンジン側への取付用ブラケットを前記本体部品に対してボルトやナット等の締結手段により固定するブラケット組付装置との二つが配置されてなるものとすることができる。これにより、車体側への取付用ブラケットとエンジン側への取付用ブラケットの双方を距離のある移送を伴うことなく順次取付け作業できる。

【0013】特に、前記部品組込及び液体封入装置は、前記液槽を本体部品に組付けた状態において前記底部上に液体を供給しかつ排出させるための液体給排手段と、前記液槽内の底部上に液体を貯留した状態で、貯留液体中において前記本体部品に対して仕切り体やダイヤフラム等の部品の組込み動作を行う部品組込ロボットとを備えてなるものが好ましい。これにより、本体部品を本体セット保持部に供給し、かつ各部品を部品セット部に供給してスタートするだけで、該部品組込及び液体封入装置の作動により部品組込作業を行うことができ、また後続の本体絞り装置の作動と組み合わせで自動化することも可能になる。従って、本体部品や各部品の供給作業を行えば、次の供給作業までの間は時間的余裕があり、各装置をU字形配置にして各装置への移動距離を小さく

したことも相俟って、洗浄や塗装あるいはブラケット取付等の他の装置での作業操作を行うことが容易に可能になる。つまり、一人の作業者が各装置を操作し作業することができる。

【0014】前記の部品組込及び液体封入装置の液槽に、底部上への液体供給時の液面高さを検出する液面検出管が連設されるとともに、該液面検出管に液面の脈動を抑える弁手段が設けられてなり、該液面検出管による液面高さの検出信号に基づいて前記部品組込ロボットの作動が制御されるように構成されている場合、液層への液体供給の過不足を生じさせず、部品組込及び液体封入作業を行うロボットの誤作動による休止を生じさせることなく組込作業できることになる。

【0015】また、前記液槽における底部の開口部には、本体部品に対して弾力的に嵌着する環状のシール部材が底部に対する下面側からの螺合手段により取着され、該シール部材が上面側から螺合操作できるように設けられてなるものが好ましい。

【0016】この場合、組立対象の防振マウントの段替えに際しては、前記液槽の底部開口部に取着されているシール部材を、本体部品の形状変更等に応じて対応するシール部材と取替えるが、このシール部材が底部下面側からの螺合手段で取着されているものであっても、その螺合操作を液槽の上面側から行えるため、その取替作業を容易に行うことができる。つまり段替えを容易に行うことができ、運転停止の時間を短縮できる。

【0017】前記部品組込および液体封入装置と本体絞り装置との間に、該部品組込および液体封入装置からの組立体の取出し、本体絞り装置への組立体の移送、及び本体絞り装置からの絞り後の組立体の取出しを順次行う取出しロボットが設置されてなるものが好ましい。

【0018】すなわち、部品組込及び液体封入装置からの前記組立体の取出し、及び本体絞り装置への移送、並びに本体絞り装置からの組立体の取出しを、前記の取出しロボットを用いて、部品組込や液体封入作業に対応して一連の連続作業の中で行うことができ、その作業を能率良く行うことができる。

【0019】前記本体絞り装置と前記洗浄乾燥装置との間のU字形配置の内側近傍に、該部品組込及び液体封入装置から前記取出しロボットにより取出された組立体を一時的にストックしておくストック台が配置されてなるものが好ましい。これにより、前記本体絞り装置から取出しロボットにより順次機械的に取出される組立体を、後続の洗浄乾燥装置への供給までストックしておくことができ、以て、部品組込及び液体封入装置と本体絞り装置による作業時間と、その後続の洗浄乾燥装置や塗装乾燥装置による作業時間とに大きな差があっても問題がなく、それぞれの装置による作業を組立体の供給毎に個々に開始することができる。

【0020】

【発明の実施の形態】次に本発明の実施の形態を図面に示す実施例に基づいて説明する。

【0021】図1は本発明に係る組立設備の1実施例を示す設備全体の略示平面図、図2は部品組込及び液体封入装置部分の拡大平面図、図3は同装置の拡大正面図、図4は同装置の要部の拡大側面図である。図5は液槽昇降手段の概略を示す液槽を断面した拡大正面図である。

【0022】図1において、Aは、例えば図19に例示する防振マウントの組立対象の液体封入式防振マウントの本体部品1に仕切り体5やダイヤフラム4等の部品を組込み液体を封入する装置である。

【0023】この部品組込及び液体封入装置Aは、一端側に開口する空間を内部に有する本体部品1を、前記開口側を上向きにして略直立状に支持する本体セット保持部10と、前記本体セット保持部10に支持した本体部品1の外周に対しシール状態に嵌合し得る開口部22を底部21に有する液槽20とを備えてなり、本体セット保持部10に支持された本体部品1に対し前記液槽20の開口部22を嵌合して組付けた状態において、適宜液体給排手段により該液槽20の底部21上に液体を供給し貯留させて、仕切り体5やダイヤフラム4等の部品を本体部品1の内部や開口部に嵌入して組込むとともに、内部に液体を流入させ封入するように構成されている。好ましくは、図示するように前記液槽20が昇降可能に配されかつ降下作用によって前記開口部22を本体部品1の開口側に対して嵌合し得るように設けられる。この装置Aの詳細な構造については後述する。

【0024】Bは、前記部品組込及び液体封入装置Aの後続において、前記部品組込及び液体封入装置Aでの部品組込み後の組立体aを、前記本体部品1に組込んだ各部品を固定し且つ開口をシールするように本体部品1の開口側を絞り加工する本体絞り装置である。

【0025】Cは、前記本体絞り装置Bの後続において、該装置から取出された絞り加工後の前記組立体aを洗浄して乾燥させる洗浄乾燥装置であり、Dは、前記洗浄乾燥装置Cの後続において、乾燥後の前記組立体aを回転可能に支持して、回転させながら刷毛塗り等の手段により塗装し乾燥させる塗装乾燥装置である。

【0026】Eは、前記塗装乾燥装置Cの後続において、塗装された前記組立体aに対して車体側の部材に対する取付用ブラケット9を圧入及びかしめ構造により取付固定するブラケット取付装置としてのブラケットかしめ装置、Fは前記組立体aに対してエンジン側の部材に対する取付用ブラケット90をナット締め等の手段により取付固定するブラケット取付装置としてのブラケット組付装置である。

【0027】Gは、前記部品組込及び液体封入装置Aと本体絞り装置Bとの間に配置した取出しロボットであり、前記部品組込及び液体封入装置Aの組込み動作に関連して動作し、ハンド先端のチャック部により部品組込

み状態の組立体aをチャックして封入液体を流さないように水平姿勢に維持したまま部品組込及び液体封入装置Aから取出して、次の本体絞り装置Bに移送するように設けられている。

【0028】Hは、前記本体絞り装置Cから取出しロボットGにより取出された絞り加工後の組立体aを一時的にストックしておくためのストック台である。

【0029】そして、前記の各装置A～Fは、図1のように所定のスペース内で平面略U字状をなすように操作側になる装置正面を内側にして配置されている。特に、この平面略U字形の配置は、前記各装置A～F間に各装置毎の作業を阻害しない程度の間隔を保有するとともに、U字形配置の内方部に、一人の作業者が最小限の動きで前記各装置A～Fを操作し作業できる空間を保有するように、比較的にコンパクトな配置とされている。図の場合、前記取出しロボットG及びストック台Hについても、前記平面略U字形の配置の内方側に沿って配置されている。

【0030】以下、前記の各装置A～Fの構成等についてさらに詳しく説明する。

【0031】まず、部品組込及び液体封入装置Aについて説明する。10は機台11上において前記本体部品1を所定のセット位置に支持して固定する本体セット保持部である。この本体セット保持部10は、プレート12の一部に固設された本体部品1の受支部材13を有し、例えば図20の防振マウントに使用する本体部品1、つまり筒状の本体金具2の一端側開口部に防振基体としてのゴム弾性体3を加硫接着手段により固着し、さらにこのゴム弾性体3に取付金具8を固着し、液体を封入するための内部空間を有する本体部品1を、開口を上向きにして支持できるようになっている。

【0032】14は前記受支部材13の近傍で前記プレート12上に立設された部品セット治具であり、防振マウント内部の部品である仕切り体5およびダイヤフラム4を、予め設定された定位置に供給載置できるようになっている。

【0033】本体セット保持部10は、図4および図10～12に示すように、該受支部材13に支持された本体部品1を固定状態に保持する固定手段15を備えている。

【0034】この固定手段15は、油圧力や空圧力により作動するシリンダ装置16と、その出力ロッド16aの前端部に固設されたチャック装置17とからなり、本体部品1が本体セット保持部10の受支部材13上に供給された状態において、ボタン操作等により運転を開始すると、シリンダ装置16が作動して前記チャック装置17が前進し、チャック装置17で本体部品1をチャックして所定の位置に固定保持できるように設けられている。

【0035】前記チャック装置17は、上下位置でそれ

ぞれ対をなす爪片18a、18aと18b、18bが開閉可能に設けられ、上部の爪片18a、18aは前記本体部品1を両側から挟持するように設けられている。下部の爪片18b、18bは、受支部材13の両側に相対向して配置された略コの字形の係合部材19、19に係合することにより、チャック装置17の上方への変位が規制されるように設けられている。

【0036】前記受支部材13は、組立対象の防振マウントの段替えを考慮して、複数の本体部品1の形態に対応できるように構成される。例えば、図13に示すように高さ調整用スペーサ13aにより、高さを調整できるように設けられる。

【0037】20は前記本体セット保持部10の上方において液槽昇降手段30により昇降可能に支持された液槽である。

【0038】液槽昇降手段30は、本体セット保持部10に本体部品1がセット固定された状態で液槽20を降下させて、後述のように本体部品1に組付け、各部品組込完了後に液槽20を本体部品1から離脱し上昇させるように設けられている。すなわち前記固定手段15の動きに連動して作動する。

【0039】前記の液槽昇降手段30は、一軸アクチュエータを用いて構成される。例えば、図においては、機台11上に立設された支持基板31の前面に、機台11上面に対し垂直方向に配されたガイド32と、このガイド32に嵌合して昇降可能に設けられたスライダ33と、該スライダ33に噛み合しかつサーボモータ等の駆動手段34により回転駆動されるねじ軸35とを有し、前記駆動手段34の作動によりねじ軸35が回転することにより、スライダ33が上下動(昇降)するように設けられている。このスライダ33に固定された取付板36に前記液槽20が取付られ、前記スライダ33の上下動に伴って液槽20が昇降するように設けられている。この液槽昇降手段30は、液槽20を本体部品1に対して組付ける際の速度、位置等を細く制御できるように構成される。

【0040】前記のほか、スライダ33をシリンダ装置等の他の手段により昇降させるように設けることもできる。

【0041】前記液槽20は、図5及び図6に拡大して示すように、底部21における前記本体セット位置との対応個所に、本体部品1の上部外周に対しシール状態に嵌合し得る開口部22が設けられている。この開口部22の内周には、オイルシール等のシール部材50が取着されて、液槽20の降下により、本体部品1の外周部に対し弾力的に嵌着してシール状態を保持できるように設けられている。そして本体部品1に組付けた状態において、前記底部21上に所定量の液体を貯留できるようになっている。

【0042】前記シール部材50は、前記底部21に対

して特に下面側からの螺合手段により脱着可能に取着され、組立対象の防振マウントの種類、特に本体部品1の形態に応じて、それに対応した形態、サイズのシール部材に取り替えできるように設けられている。本発明では、この取替のための螺合操作を上面側つまり液槽20の上方側から行えるように設けられている。

【0043】具体的には、図6及び図7に示すように、前記シール部材50は、ステンレスやアルミ等の金属あるいは合成樹脂等の剛性材よりなる環状の外周体51の内周に、ゴム弾性体よりなる断面略U字形のシール体52が加硫接着や圧入手段等により固着されてなる。前記外周体51の外周面に螺条が形成され、液槽底部21の開口部22内周に対して螺合できるようになっている。前記外周体51の下端部には外方に張り出したフランジ状部53を有し、該外周体51が開口部22内周に螺合し取着した状態において、底部21下面との間に環状のシール材54を挟持できるように形成されている。

【0044】そして、底部21の上面に突出状に臨出する前記外周体51の上面には、平面において軸心に対して十字方向の位置に螺合操作用の溝状の切欠55が形成されており、これにより、螺合操作用具を使用する螺合操作を上面側から行えるようになっている。これにより、段替えのためのシール部材50の取替え作業は容易に行える。しかも、前記シール部材50は液槽20の底部21に対して下面側から螺合されて取着されるため、螺合部分のシール材54を従来と同様に保持できる。

【0045】図8及び図9は、本体部品1の変更に応じて前記シール部材50を変更した例を示している。

【0046】この実施例では、前記シール部材50の外周体51は、底部21上面より突出状に臨出する上端部内周に、前記シール体52に嵌合する本体部品1の上端部が当接する位置決め用の内フランジ56を有し、該内フランジ56を含む外周体51の上面に、軸心に対して十字方向の螺合操作用の溝状切欠55が形成されている。これにより、その内側に嵌合する本体部品1を位置決めでき、ひいては液槽20と本体部品1の組付け状態を常に一定に保持できるようになっている。

【0047】前記いずれの実施例のシール部材50においても、上面に形成する螺合操作用の切欠55としては、螺合操作用の治具の形態に応じて、円形穴その他のどのような形状をなすものであってもよく、またその位置や間隔、数も任意に設定できる。図のような十字方向の溝状の切欠よりなる場合、マイナス形状の治具を使用して容易に螺合操作できることになる。また液の流通もよくなる。

【0048】また、前記液槽20の底部21上に液体を供給しかつ排出する給排手段として、図示する実施例においては、液槽20の長手方向の一方端側の底部21に前記の開口部22が形成され、この開口部22の付近を除く一部分、例えば長手方向の他端側の一部に、下方に

落とし込んで所要量の液体Wを貯留できるようにした凹部24が設けられ、さらに凹部24に嵌入し得る凸部分25aを下面側に有する充填フロート25がシリンダ装置26に連結されて、該シリンダ装置26の作動により昇降するように設けられており、この充填フロート25の昇降作用によって、前記凹部24内に貯留されている液体Wを底部21上に供給あるいは底部21上から排出できるように構成されている。

【0049】すなわち、前記充填フロート25が降下し凹部24に嵌入することにより、凹部24内の液体Wが底部21上に押し出されて所定の液面高さに貯留され、また、前記充填フロート25が上昇することにより前記底部21上の液体Wが凹部24内に戻流するようになっている。

【0050】前記の凹部24の容積、および充填フロート25の体積は、充填フロート25の降下嵌入時に該充填フロート25外の底部21上に、後述する部品のエア切り操作等に必要な所定の液面高さを確保できるように設定される。

【0051】27は前記液槽20に液体を補給するポンプ等の補給手段（図示せず）と連結された補給管であり、前記凹部24の底部に接続されている。液体の補給手段は、1回の液体封入作業毎に液体が減少することになるので、前記液体の給排手段による液体供給時、つまり充填フロート25の降下による液体供給時に、前記液槽20の底部21上に一定以上の液体を貯留できるように、適宜液槽20内に液体を補給するように設けられる。通常、液体補給手段としてのポンプは、後述する液面高さの検出結果に基づいて作動するように設けられる。前記凹部24の底部には、保守点検や洗浄等の際に液槽20内の液体を排出させるための排出口（図示せず）も設けられる。

【0052】なお、液槽20の底部21上への液体の給排手段としては、上記のほか、例えばポンプ手段による給排機構を利用する等、種々の手段を利用できるが、実施上は上記のように構成するのが、機構が簡単でしかも液体の給排作用を迅速かつ確実に行なえ、特に好ましい。

【0053】40は前記の液体給排手段による底部21上への液体供給時の液面高さを検出する液面検出管であり、該液面検出管40による液面高さの検出信号に基づいて装置制御部を介して後述する部品組込ロボット60の作動が制御されるように構成される。この液面検出管40は、液槽20下部に液体流入可能に接続された縦方向の検出用配管41を有し、この検出用配管41の少なくとも一部に透明管部42が設けられるとともに、該透明管部42に近接して流入液体の液面高さを検出するレベルセンサー43が設けられてなり、液槽20と共に昇降できるように設けられる。44は前記レベルセンサー43の支持部材である。

【0054】60は多軸多関節ロボット等よりなる部品組込ロボットであって、そのハンド61の先端部に開閉自在な一對の爪片63、63を有するチャック装置62が設けられている。この部品組込ロボット60は、前記液面検出管40による検出信号に基づいて制御され、前記液槽20の底部21上への液体供給時の液面高さが一定レベルに達したことを検出したとき、その検出信号を受けた装置制御部からの信号により作動を開始し、また前記液面高さが一定レベル以下のときには作動を停止するように設けられる。

【0055】この部品組込ロボット60は、本体セット保持部10上にセットされ固定された本体部品1の位置、部品セット治具14にセットされた各部品の位置、本体部品1に組付けられた液槽20の高さや該液槽20内の底部21上の液面高さ等の位置関係、液槽20の降下により本体部品1との組付け動作、さらには前記液面高さに応じて、上記した部品セット治具14にセットされる仕切り体5やダイヤフラム4等の部品を順次前記チャック装置62でチャックし、本体部品1に組付けられた前記液槽20の上方に移動させるとともに本体部品1との対応位置で降下させて、所定のエア切り動作、例えばチャックした部品を傾き姿勢で液体中に浸漬する等のエア切り動作や後述する組込み動作を行なうように設定され、ティーチングされている。さらに必要に応じてその動作を補正するように設けられている。

【0056】なお、この部品組込及び液体封入装置Aは、一つの製品についての一連の部品組込動作が完了すれば、次の本体部品1の供給に備えて待機状態になり、本体部品1の供給毎にスタートボタン等を操作するようになっている。70は部品組込及び液体封入装置Aの装置制御部及びスタートボタンや停止ボタン等を備える操作部である。

【0057】また、本体絞り装置Bは、例えば、図14に示すように、上記の部品組込及び液体封入装置Aから取出しロボットGにより取出されて移送される部品組込状態の組立体aを、その開口側を上方向きにして支持する保持部101と、その上方においてシリンダー装置102により昇降する絞り型部103とを備えている。絞り型部103は、その降下作用に伴って、前記組立体aにおける本体部品1を構成する筒状の本体金具2の開口側を縮径させる絞り加工を施せるように構成されている。この絞り型部103の型構造は、従来より公知あるいは既存の絞り装置と同様のものを利用できるので、その詳しい説明は省略する。

【0058】前記部品組込及び液体封入装置Aと本体絞り装置Bの間に設けられる取出しロボットGは、部品組込及び液体封入装置Aから組立体aをハンド106の先端に有するチャック部107によりチャックして取出し、次の本体絞り装置Bに移送するように設けられるが、さらに本体絞り装置Bから絞り加工後の組立体aを

チャックして取出すように設けておくのが好ましい。この場合、取出した組立体aは、U字形配置の内側に沿って設けられたストック台Hに落とし込むように設けられる。

【0059】また、前記本体絞り装置Bの後続の洗浄乾燥装置Cは、図15に略示するように、ストック台Hから1個ずつ取り出されて供給される組立体aを保持する籠形の回転受け台111と、該回転受け台111上の組立体aに対し80℃前後の温水を噴射する噴射ノズル112とを備えてなり、この温水噴射により組立体aの外周に付着している封入液体の一部や油分等の異物や汚れを落とすようになっている。必要に応じて、洗浄後の乾燥を早くするための送風手段(図示せず)を設けておくこともできる。また前記回転受け台111により略直立状に支持するように設けることもできる。この洗浄乾燥装置Cは、作業者が前記組立体aの供給した際に操作部110に設けたスタートボタン等の操作で運転動作させる。運転時間は洗浄の効果等に応じて適宜設定される。

【0060】前記ストック台Hは、U字形配置の内側に沿って、例えば前記本体絞り装置Bの側から洗浄乾燥装置Cの側へ傾斜したシュートからなり、その下部において複数の組立体aをストックできるようになっている。ストックされた組立体aは、作業者が1個ずつ順次洗浄乾燥装置Cに供給する。ストック台Hとしては単なる箱形のものであってもよい。

【0061】塗装乾燥装置Dは、図16に略示するように、組立体aを直立状態でその軸心を中心に回転可能に支持する回転支持台121を備え、該回転支持台121により支持され回転する組立体Aに対して作業者による刷毛塗りにより所定の塗装を施せるようになっている。122は塗装後の乾燥のための送風手段であり、吹き出し口122aより送風できるようになっており、123は塗装時の飛沫の拡散を防止するカバー、124は受け皿である。

【0062】なお、塗装手段としては、スプレー塗装も可能であり、そのためのノズル部材125を併設しておくこともできる。しかし、その場合、スプレー塗装のための機構、及びその制御機構等が複雑になり、コスト高になるので、この塗装作業は前記のように作業者による刷毛塗りとするのが好ましい。120はその塗装乾燥装置Dの作動させための操作部である。

【0063】第1のブラケット取付装置としてのブラケットかしめ装置Eは、図17に略示するように、前記組立体aを直立状態に支持、好ましくは取付金具8を下向きにして直立状態に支持する支持部131と、その上方においてシリンダー装置132により昇降するかしめ用型部133とを備えている。かしめ用型部133は、その降下作用によって、前記支持部131に支持した組立体aに対し車体側の取付用ブラケット9を圧入しかつ端部をかしめ固定できるように設けられている。

【0064】すなわち、前記取付用ブラケット9は、図19のように組立体aにおける本体金具2に対し圧入される筒部9aに、ボルト締結用孔を有するブラケット部片9bが一体に付設されてなり、前記かしめ用型部133の降下作用により、前記筒部9aが本体金具2に圧入されるとともに、その端部がかしめ固定されるように構成されている。このかしめ用型部133の構造は、従来より公知あるいは既存の装置と同様のものを利用できるので、その詳しい説明は省略する。135はスタートボタン等を備える操作部である。

【0065】また、第2のブラケット取付装置としてのブラケット組込装置Fは、図18に略示するように、前記組立体aにおける取付金具8を上にして、直立状態に支持する支持部141と、その上方においてシリンダ装置142により昇降するボルトランナー装置143とを備えている。ボルトランナー装置143は、その下端部に取付用ボルト91を保持して回転するランナー本体144を有し、前記支持部141に支持した組立体aの前記取付金具8に対しエンジン側の取付用ブラケット90をセットした状態において、ランナー本体144が取付用ボルト91を保持した状態で回転しながら降下することにより、前記ボルト91を前記ブラケット90の上から所定の締め付け力で締め付けるように設けられている。145はスタートボタン等を備える操作部である。

【0066】なお、取付用ボルトを取付金具8に突設しておいて、該取付用ボルトに対しブラケット90をナット締めにより固定することもできる。この場合、前記ボルトランナー装置143はナットランナー装置として構成しておく。

【0067】なお、前記取付用ボルト91やナット等は、ランナー本体144の下端部に手で保持させることも、自動供給手段により保持させることもできる。また、前記支持部141への組立体aの供給及びブラケット90のセット作業を作業者が行う際、同時に、前記ボルト91を仮締めしておくこともできる。ボルトランナー装置143あるいはナットランナー装置の締め付け機構等は、従来より公知あるいは既存の装置と同様のものを利用できるので、その詳しい説明は省略する。

【0068】前記のブラケット取付装置としてのブラケットかしめ装置Eとブラケット組付装置Fは、液封入式防振マウントの形態によっては、いずれか一方を省略する場合もある。

【0069】上記の構成による組立設備により、図19の液体封入式防振マウントを組立てる場合について説明する。

【0070】まず、部品組立及び液体封入装置Aにおいて、内部に空間を有して一端側に開口する本体部品1を、前記開口を上方に向けた略直立状態にして本体セット保持部10の受支部材13上に供給しセットする。また仕切り体5およびダイヤフラム4等の部品を、部品セ

ット治具14の上の定位置に載置しておく。

【0071】こうして、スタートボタン操作等により装置の運転を開始すると、本体セット保持部10において、固定手段15のシリンダ装置16が作動して先端のチャック装置17が前進し、チャック装置17で前記本体部品1をチャックして前記セット位置に固定保持する。

【0072】本体部品1が固定されると、次に液槽昇降手段30が作動し、駆動手段34の駆動により、図5の鎖線のようにスライダ33とともに液槽20が降下し、底部21に有する開口部22がこれに位置合せされて保持されている前記本体部品1の外周に嵌合し、該開口部22に設けられたシール部材50を介してシール状態を保持するように組付けられる。このとき、図8のように底部21上面より臨出する上端部内周に内フランジ56を有する場合、前記シール体52に嵌合した本体部品1の上端部が当接することで位置決めされ、嵌合による組付け状態が常に一定になる。本体部品1の液体との接触面積も少なくなる。

【0073】この液槽20には、その底部の一部に設けた凹部24に所定量の液体Wが貯留されており、前記の組付けが完了した後、充填フロート25がシリンダ装置26の作動により降下し、図5の鎖線のように凸部分25aが前記凹部24に嵌入することにより、凹部24内の液体Wを、前記本体部品1が嵌合している底部21上に押し出し供給する。これにより、液体が底部21より臨出している本体部品1の開口端より本体部品1の内部空間9に流入し、かつ部品組込みに必要な所定の液面高さに貯留される。

【0074】また、前記底部21上への液体の供給の際、前記液体Wの液面が一定レベルに達したとき、部品組込ロボット60を作動させて、部品セット治具14上の所定位置に供給セットされている仕切り体5及びダイヤフラム4等の部品を、順次ハンド61先端のチャック装置62でチャックして、前記液槽20の上に移動して、所定の傾き姿勢に保持したまま降下し、前記液槽20に貯留された液体Wに傾き姿勢で浸漬する等してエア切りを行った後、液体W中で水平に戻して前記本体部品1の開口端より嵌入し組み込む。この際、必要に応じて、仕切り体装着用及びダイヤフラム装着用シリンダ65を用いて所定位置に押し込むようにして組込むことができる。また、前記部品組込ロボット60のハンド61は、元の位置に復帰して、次の組込み作用に備える。

【0075】前記のように各部品の組込みが完了すると、シリンダ装置26の作動により、充填フロート25が上昇し、これに伴って液体Wが凹部24に戻流し、底部21上から排出される。この後、液槽昇降手段30の作動により、前記液槽20を上昇させ本体部品1より離脱させる。また、固定手段15のチャック装置17によ

るチャック作用を解除して、シリンダ装置16によりチャック装置17を元の位置へ復帰させる。

【0076】前記の一連の動作が完了すると、取出しロボットGが作動し、前記本体セット保持部1に支持されている部品組込状態の組立体aを、ハンド106の先端に有するチャック部107によりチャックして、液体を流出させないように水平姿勢に保持した状態で取り出して、次の本体絞り装置Bに移送し、保持部101に開口側を上方向きにして支持させる。こうして取出しロボットGのハンド106は組立体aから離脱する。この状態で、シリンダ装置102の作動により、絞り型部103が降下することにより、前記組立体aにおける筒状の本体金具2の開口側を縮径させる絞り加工を行い、組込んだ仕切り体及びダイヤフラム等の部品を固定し、液漏れしないように端部をシールする。この絞り加工が完了すると、前記絞り型部103が上昇するとともに、前記取出しロボットGが再び作動して、前記保持部101上の組立体aをチャックして取り出し、後述の洗浄乾燥装置Cへの供給用のストック台Hに落とし込む。取出しロボットGは元の待機位置に復帰する。

【0077】ストック台Hに取出された絞り加工済みの組立体aは、ここで適宜にストックしておいて、後続の各装置の進み具合等に応じて、適宜作業者が1個ずつに洗浄乾燥装置Cに供給して洗浄する。すなわち、組立体aを籠形の回転受け台111上に供給して、スタートボタン等の操作で運転を開始し、前記受け台を回転させながら一定時間温水を噴射して洗浄する。洗浄後、一定時間において、必要により送風しながら乾燥する。乾燥した組立体aは、該洗浄乾燥装置Cから取り出し、そのまま次の塗装乾燥装置Dに供給するか、あるいは塗装乾燥装置Dに供給するための供給待機部（図示せず）にストックしておく。

【0078】塗装乾燥装置Dでは、前記のように洗浄され乾燥された組立体aを、作業者が1個ずつ回転支持台121に供給して直立状態に支持させる。こうしてスタートボタン操作により回転支持台121とともに組立体aを回転させ、その所定の個所、例えば取付金具等に所定の塗装を行う。この塗装は、作業者が回転する組立体aに対して刷毛塗りすることにより行う。塗装が完了すれば、送風用の吹き出し口122からの送風により乾燥させる。また必要に応じて、前記回転支持台121から取り出して台上に置いておく乾燥させることもできる。後続の装置での作業の進み具合によっては、そのままストックしておくこともある。

【0079】この組立体aの塗装及び乾燥が完了すれば、前記組立体aを次のブラケット取付のためのブラケットかしめ装置Eに供給する。このブラケットかしめ装置Eでは、前記組立体aを支持部131により直立状態に支持するとともに、この組立体aに対し取付用ブラケット9の筒部9aを本体金具2に対して部分的に嵌合し

た状態にセットしておく。この状態で、シリンダ装置132によりかしめ用型部133を降下作用により、前記取付用ブラケット9の筒部9aを本体金具2に対して圧入し、さらにその端部をかしめ固定する。そして、かしめ用型133の上昇後、前記組立体を取り出す。

【0080】この後、さらにエンジン側の取付用ブラケット90を取り付ける場合には、前記の組立体aを、第2のブラケット取付装置としてのブラケット組付装置Fに供給して、該組付装置Fに備える支持部141に、前記組立体aにおける取付金具8を上にして直立状態に支持する。そして、取付金具8に取付用ブラケット90を取付孔部を嵌合してセットするとともに、取付用ボルト91をボルトランナー装置143のランナー本体144にセットしておくか、あるいは取付用ネジ孔8aに対し仮締めしておく。この状態で、シリンダ装置142の作動によりボルトランナー装置143を降下させ、回転するランナー本体144により前記締付けナット91を締め付け、前記ブラケット90を固定する。そして、ボルトランナー装置143の上昇後、前記組立体aを取り出し回収する。

【0081】これにより、図19に示すように、本体部品1の内部に仕切り体5やダイヤフラム4等の部品を組み込みかつ液体を封入し、所定の塗装を施し、本体部品1の外周部と端部とに車体側の取付用ブラケット9とエンジン側のブラケット90を取付他液封入式防振マウントを組立てることができる。

【0082】特に、設備全体を平面略U字形に配置したことにより、設備全体のスペースをコンパクト化でき、各装置での作業操作をU字形配置の内方側から一人の作業者が行うことが可能となり、またその場合の動き（移動量）も少なく済む。しかも、本体部品への部品組込及び液体封入、並びに絞り加工の工程を連続化し、その後の洗浄、塗装、ブラケット取付等の各工程を個々に作動させるようにしたこと、各装置を前記U字形配置の内方側からの一人の作業者による作業操作によって効率よく行うことができる。

【0083】

【発明の効果】上記したように本発明によれば、本体部品の開口側に液槽を組み付ける方式の部品組込及び液体封入装置を用いて、組立設備の全体を平面略U字形に配置したことにより、液体封入式防振マウントの組立設備の配置スペースをコンパクト化でき、設備費用の大幅な削減、合理化、生産性の向上を図ることができる。

【図面の簡単な説明】

【図1】本発明に係る組立設備の1実施例を示す設備全体の略示平面図である。

【図2】部品組込及び液体封入装置部分の拡大平面図である。

【図3】同上装置の正面図である。

【図4】同装置の要部の側面図である。

【図5】図5は液槽昇降手段の概略を示す液槽を断面した拡大正面図である。

【図6】同上の液槽のシール部材の取着部分の拡大断面図である。

【図7】同シール部材の斜視図である。

【図8】他の実施例のシール部材の取着部分の拡大断面図である。

【図9】同シール部材の一部を欠載した斜視図である。

【図10】本体セット保持部の拡大平面図である。

【図11】同上の本体部品を固定した状態の正面図である。

【図12】本体セット保持部と液層との関連を示す断面図である。

【図13】他の例の本体セット保持部と液層との関連を示す断面図である。

【図14】本体絞り装置部分の略示正面図である。

【図15】洗浄乾燥装置部分の略示正面図である。

【図16】塗装乾燥装置部分の略示側面図である。

【図17】ブラケットかしめ装置部分の略示正面図である。

【図18】ブラケット組込装置部分の略示正面図である。

【図19】組立て対象の液体封入式防振マウントを例示する断面図である。

【符号の説明】

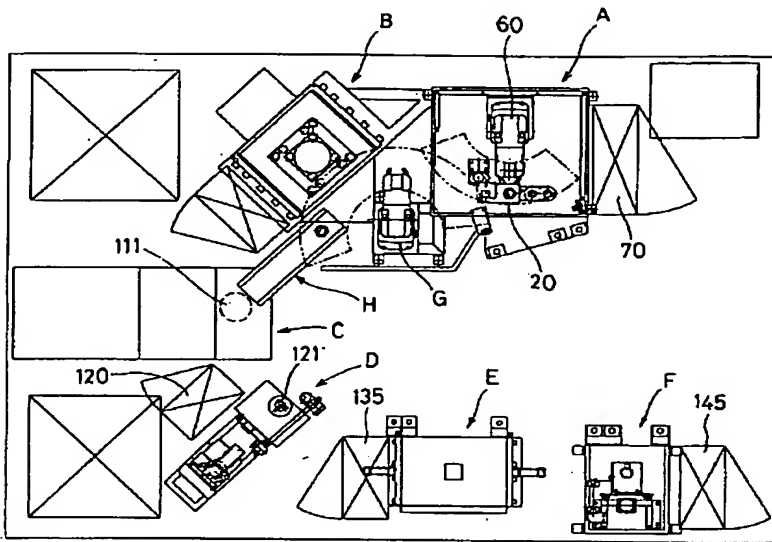
A 部品組込及び液体封入装置
B 本体絞り装置
C 洗浄乾燥装置
D 塗装乾燥装置
E ブラケットかしめ装置
F ブラケット組付装置
G 取出しロボット
H ストック台
W 液体
a 組立体
1 本体部品
2 筒状の本体金具
3 ゴム弾性体
4 ダイアフラム
5 仕切り体
6 a、6 b 液室
7 オリフィス
8 取付金具
8 a 取付用ネジ孔
9 取付用ブラケット
9 a 筒部
9 b ブラケット部片
10 本体セット保持部
11 機台
13 受支部材

14 部品セット治具
15 固定手段
16 シリンダ装置
17 チャック装置
20 液槽
21 底部
22 開口部
24 凹部
25 充填フロート
26 シリンダ装置
30 液槽昇降手段
33 スライダ
34 駆動手段
35 ねじ軸
40 液面検出管
41 検出用配管
42 透明管部
43 レベルセンサー
45 弁手段
50 シール部材
51 外周体
52 シール体
53 フランジ状部
54 シール材
55 切欠
56 内フランジ
60 部品組込ロボット
61 ハンド
62 チャック装置
70 操作部
90 取付用ブラケット
91 取付用ボルト
101 保持部
102 シリンダー装置
103 絞り型部
106 ハンド
107 チャック部
110 操作部
111 回転受け台
112 噴射ノズル
121 回転支持台
122 送風用の吹き出し口
124 ノズル部材
131 支持部
132 シリンダー装置
133 かしめ用型部
135 操作部
141 支持部
142 シリンダー装置
50 143 ナットランナー装置

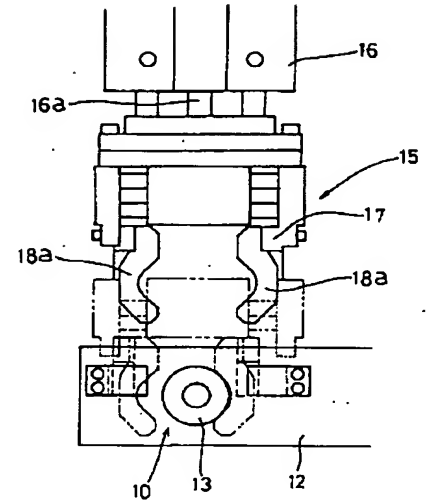
144 ランナー本体

145 操作部

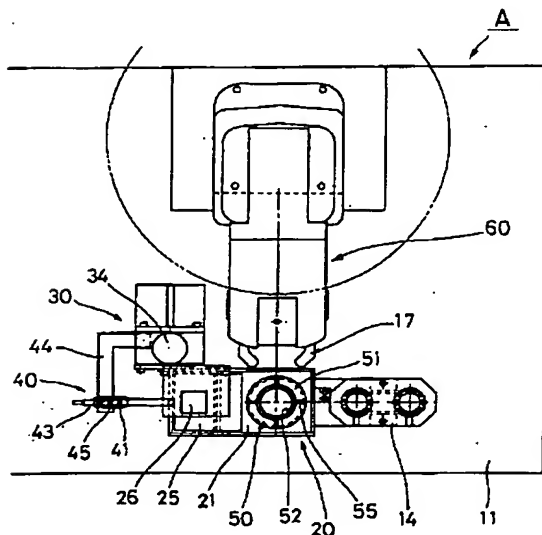
【図 1】



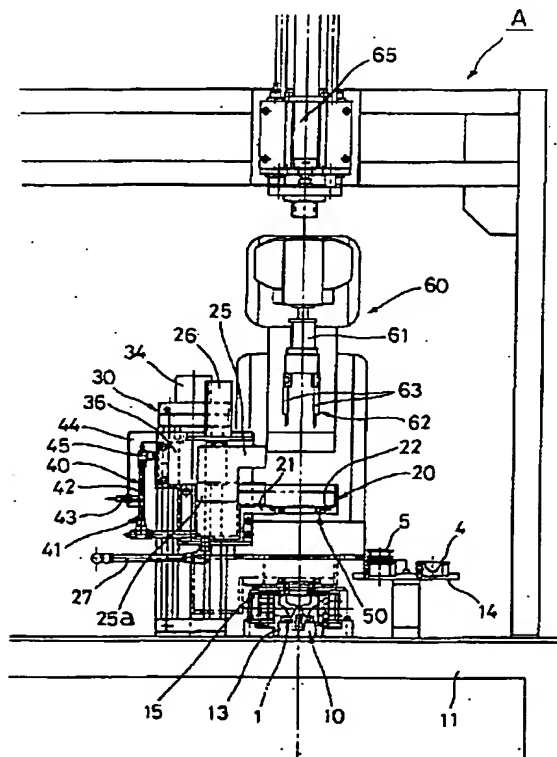
【図 10】



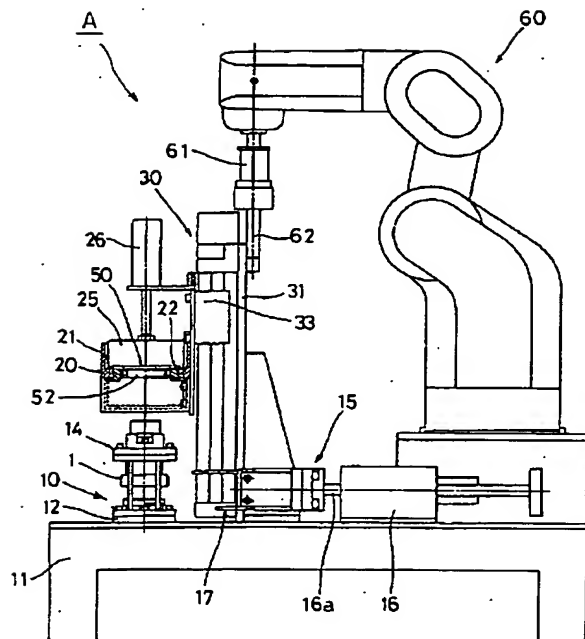
【図 2】



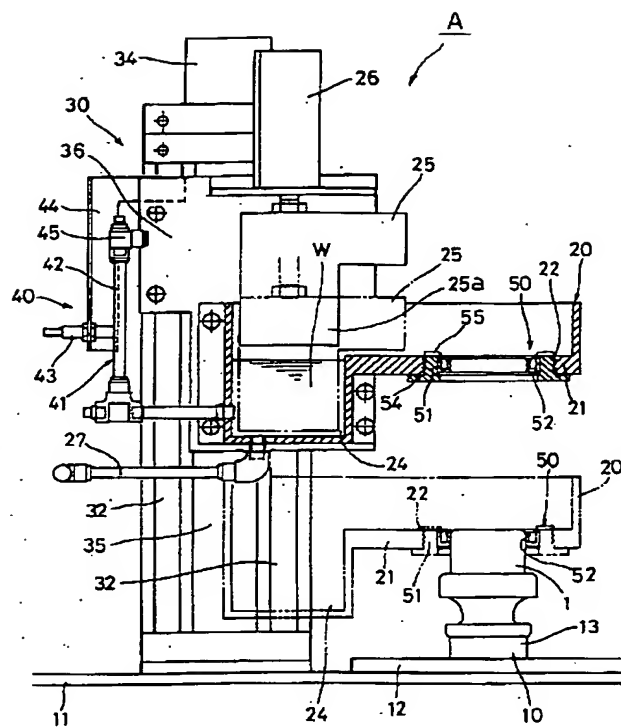
【図 3】



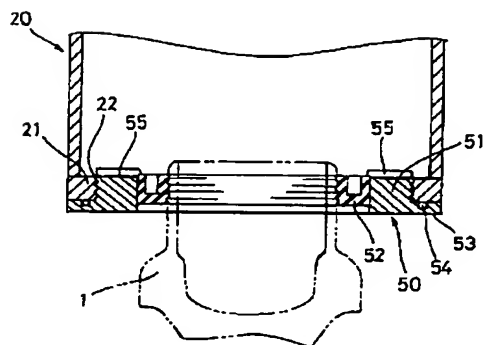
【図4】



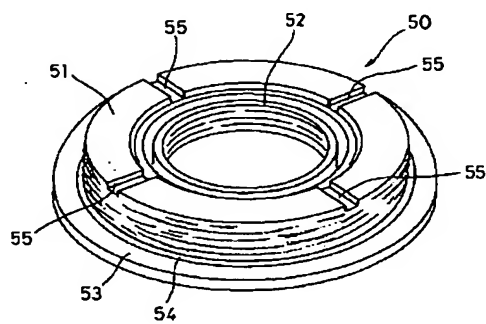
【図5】



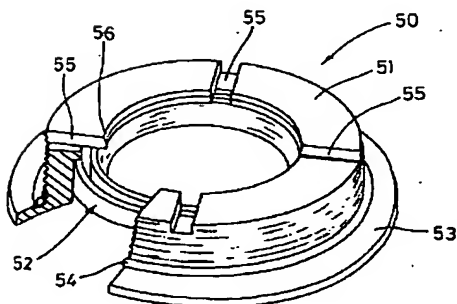
【図6】



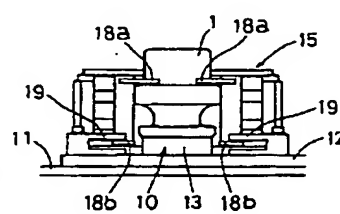
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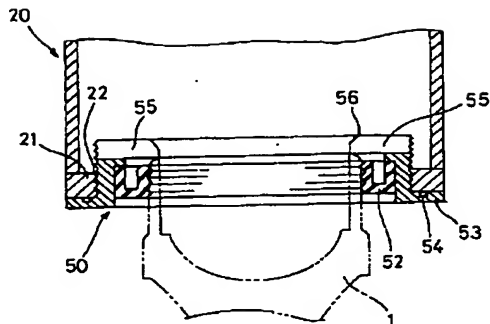
【図9】



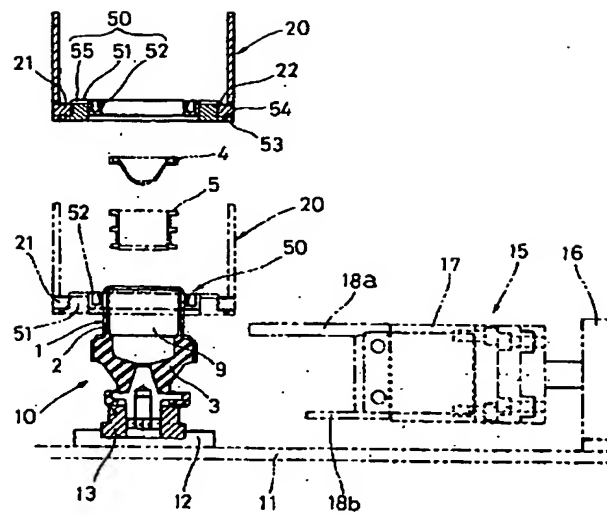
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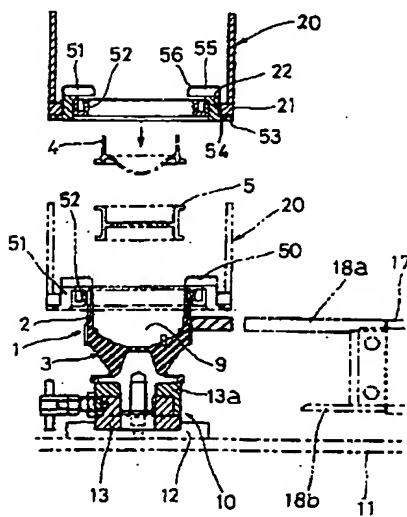
【図8】



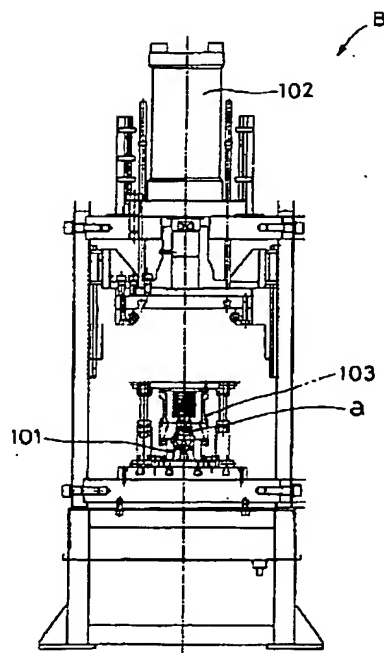
【図12】



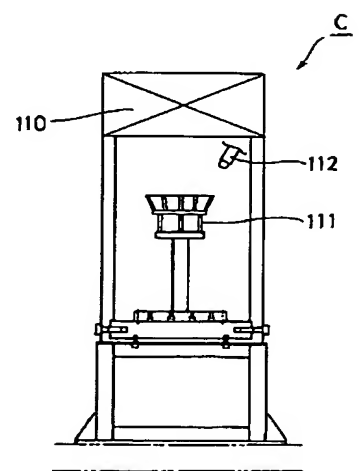
【図13】



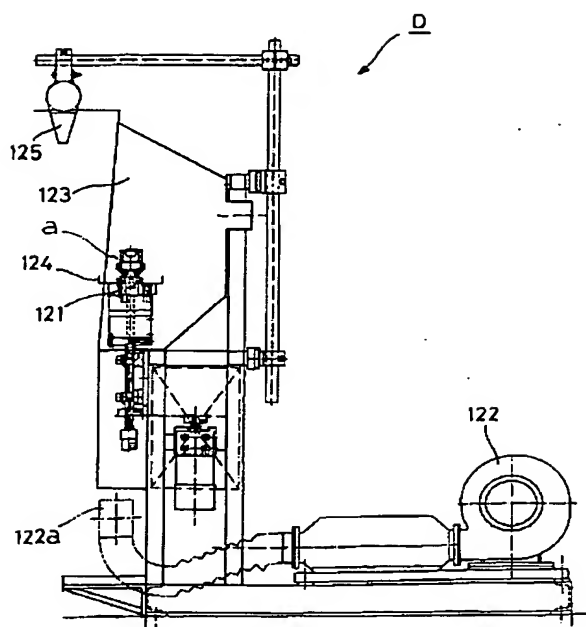
【図14】



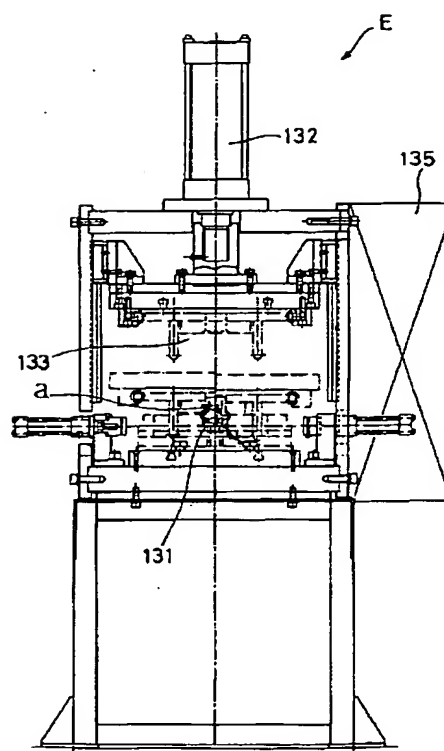
【図15】



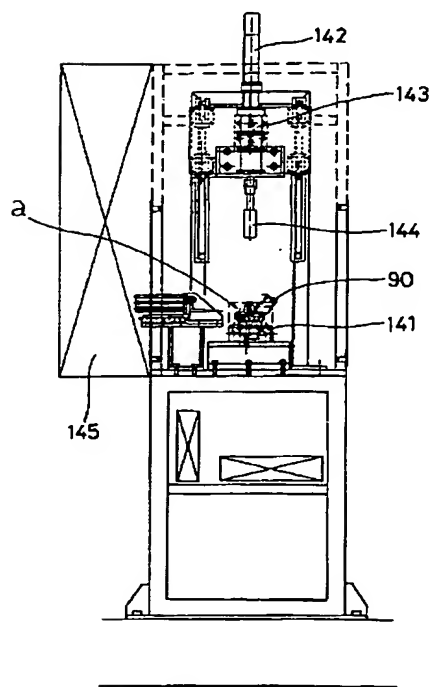
【図16】



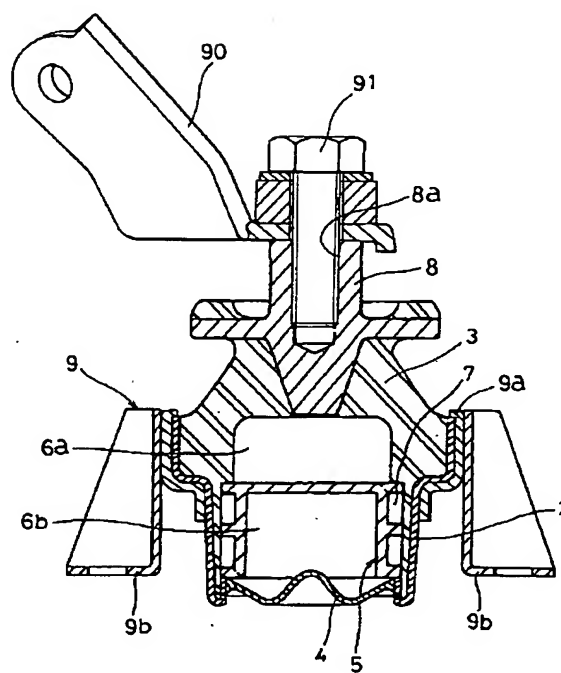
【図17】



【図18】



【図19】



フロントページの続き

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